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bulletin

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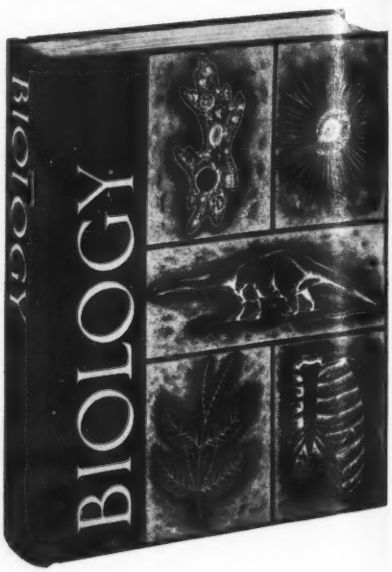

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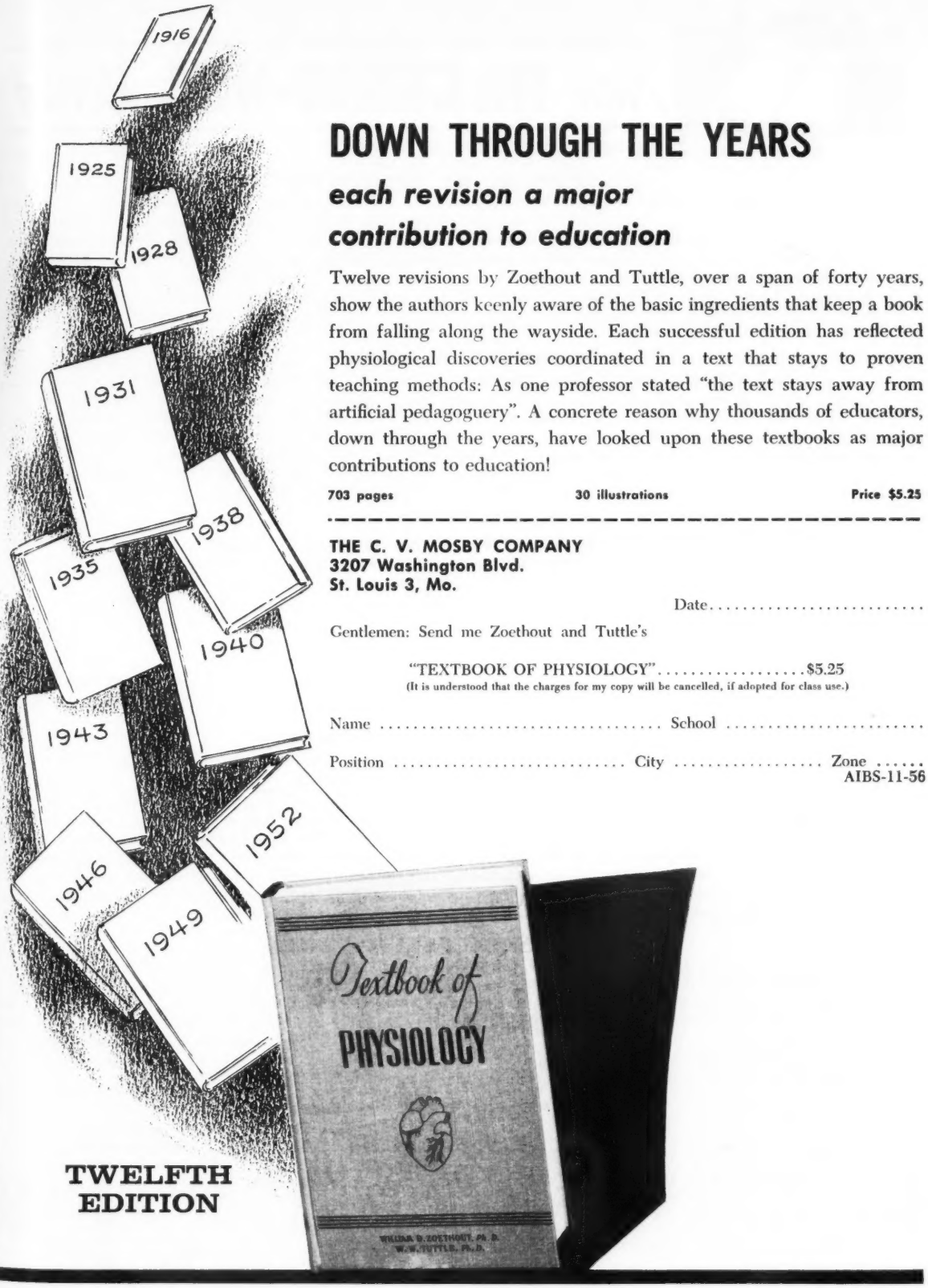

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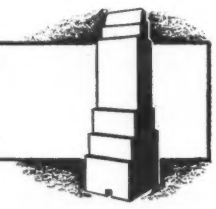

Biology Unlimited

BYRON T. SHAW, *Administrator, Agricultural Research Service, U.S.D.A.*

Abstract of Address before the American Institute of Biological Sciences
University of Connecticut, Storrs, Conn., August 27, 1956

IN THE last quarter-century, science has brought this country greater material advances than in any period in all history. Scientific breakthroughs in the laboratory have been translated by agriculture and industry into new products and new practices that have revolutionized our standards of living and our way of life.

In the face of record boosts in population, science has given farmers new crop varieties, new fertilizers and pest control chemicals, and new farming techniques to produce an unparalleled abundance of food and fiber. Research has given us all a better understanding of food values and shown us how to translate this understanding into improved diets and better nutritional health.

The conduct of research itself has undergone quite as drastic a revolution. The research laboratory has been converted from a room in the basement to a multi-million-dollar plant. A task force of a hundred scientists may be thrown into one project to convert a fundamental discovery into a practical reality. It has been estimated that the United States today is spending $5 billion a year for research—or more in one year than in all the years from 1776 to 1933. Current research expenditures by the Governmental total more than the *entire cost* of Government in 1900.

Why are we spending all this money for research—in view of the high level of living we have attained in the last decade or so? My answer is that our age is bringing changes faster than ever before, and each change brings new opportunities that make additional research worth while.

Let us consider just one of these changes—the change in population—not only in increasing numbers but also in composition, concentration, and activities. One estimate indicates that by the year 2000 we may have a population of 275 million people in this country. An increase of 8 years in life expectancy within the last few years means that we soon will have a great many more older people. Our rising birth rate means more young people.

More married women are taking jobs outside the home—in industry, business and the professions. Industry is being called on to provide more of the goods and services required in everyday living. Thus, increasing numbers of people will be concentrated in urban centers—dependent on agriculture for food and other farm products.

I believe that it will be the job of scientists in all fields—physical, biological and social—to interpret these changes in terms of human needs and wants and to provide the scientific knowledge for their attainment. It will then be the job of industry and agriculture to translate this knowledge into products and practices for better living.

The implications for agriculture and agricultural research are obvious. The success of farmers in providing the kinds and quantities of food and fiber needed in the future will depend in large measure on accomplishments of biological scientists now and in the immediate years ahead. We can be confident that they will be provided because of what has happened in the past. Some of our greatest advances in farming have come as a result of the application of discoveries made in basic research in the biological sciences.

We are all familiar with the developments that led to the phenomenal spread of hybrid corn during the last 15 to 20 years. Hybrids now occupy 90 percent of our corn acreage, and the percentage is still going up. But the story behind hybrid corn began 50 years ago when Shull and East crossed inbred lines of corn and observed hybrid vigor.

Another biological principle was established when Theobald Smith, the animal pathologist, discovered that ticks spread cattle fever, and plant pathologist Merton B. Waite showed that insects carried pear blight from tree to tree. These two men started us on the road that has led to the control of many of our worst crop and livestock diseases by controlling the insects that carry them.

It was only about 25 years ago that W. W. Garner and H. A. Allard discovered photoperiodism—or the influence of light on plants. Their discovery explained many things not previously understood about the flowering and fruiting of plants and provided a valuable research tool in the development of new crop varieties adapted to specific areas of the country.

The more recent discovery that certain chemicals can influence the behavior of plants has already paid off in the development of 2,4-D and other chemical herbicides that are now being used to control weeds on some 30 million acres of farm land.

Among the many other discoveries in the biological sciences that have contributed to the advancement of agriculture are: the work of the geneticist Sewall Wright, who worked out the principles of quantitative inheritance now applied generally in animal breeding—the studies of Henry Clap Sherman, which gave definite proof that diet alone (the right combination of nutritional factors in the right quantities) can lengthen the life span and increase vigor and well-being throughout life—Dr. Fleming's discovery, in England, of penicillin—Dr. Waksman's work with soil microbes, which gave us streptomycin—the discovery of the aerosol principle of applying insecticides.

Now let us turn to the future and take a look at some of the problems facing agriculture and some of the ways in which biological scientists can help in solving them. The problems are apparent in all phases of agriculture, but let us consider just one of them—the growing demand for livestock products.

We know that more livestock products mean more animals. And more animals require more feed and forage. In our research on forage crops, we are now just about where we were on hybrid corn 30 years ago. Less than a dozen of the 75 or more important forage grasses have been improved by breeding for higher yield and quality. Losses from diseases, insects, and weeds amount to billions of dollars annually. Antibiotics and other new chemicals offer great promise in disease control but most of our information so far is strictly empirical. Although we know that antibiotic materials are absorbed and move through the plants, we do not know how they produce the results observed.

Experimental results in chemical weed control are excellent. But why are only 2½ million acres being sprayed? The answer is that our knowledge is too fragmentary and too limited. We need more information on herbicides—on volatility of the chemical, its relationship to temperature, moisture, and light, and its effect on growth and quality of the crop. And we need more information on weeds themselves—on their nature, life cycle, growth and seeding habits, and ecology.

New knowledge may give us entirely new ways of controlling weeds. We already have one example of what can be done in biological control: the millions of acres in the West that have been freed of klamath weed by parasites liberated several years ago. Another possibility might be the development of diseases that would attack the weed without injuring the crop. Why not develop strains of diseases to which certain weeds are susceptible? We know, for example, that stem rust race 15B kills some grasses.

Biological control of insects is another field barely explored. The effectiveness of the parasite *Lydella* in reducing the corn borer population in areas where it has become established gives a good hint of what we might expect from this method of insect control.

We have many obstacles to overcome in continuing our progress

in chemical control of insects. Every year additional insects are showing resistance to the insecticides now in use. To keep ahead, we must know more about both the insects and the insecticides. What is the mechanism that triggers the resistance—what happens to the insecticide in the insect's body—how can the development of resistance be prevented or combated?

We have only just started in our work with systemic insecticides. We have hardly scratched the surface in the field of research on attractants to control insects. A biologist may some time show us how to reproduce and use in a practical way the natural chemicals or sounds that attract insects to each other.

We need much more fundamental knowledge about entire classes of insects. For example, we know almost nothing about the insects that live in the soil and damage and destroy crops from below the surface. These may be among the most important of all insect pests from the standpoint of increased forage production.

And the problem does not stop with insects. We are faced with a whole group of soil-borne parasites that cause root diseases of plants. To drench the soil sufficiently with antibiotics or with any industry-produced chemical would be far too costly. Many of the parasites have such ranges of hosts that no feasible crop rotations have been found. They are so omnivorous in their attacks that finding resistant plant varieties appears remote.

The total microbial ecology of the soil, therefore, constitutes a research program for the future. It will be necessary, to seek out soil and crop management practices whereby antibiotic influences are produced in the soil that will wipe out the parasites without destroying beneficial organisms that are concerned with decomposition of organic matter, the transformation of mineral elements, or the fixation of nitrogen.

And this calls to mind another question that is waiting for some biological scientist to answer. Can we extend the number of plant species that fix their own nitrogen? The suggestion that non-leguminous species might be nodulated has been a scientific teaser for more than 30 years. We do not yet know how nitrogen is fixed biologically, but we are adding to our knowledge. Fundamental studies are showing that molybdenum is an essential element. The effectiveness of the symbiotic process can be changed by modifying the bacteria or the host plant. For example, a Canadian scientist has succeeded in making parasitic strains of *Rhizobia* produce combined nitrogen by treating them with X-rays. We can more accurately follow the break-down of organic matter and of nitrogen balance in the soil. So the possibility that grasses, as well as corn and other crop plants, can be nodulated or made to fix their own nitrogen is not so remote as it once seemed.

These are only a few of the many problems relating to the increased production of livestock feed. And feed is only one item in the whole scheme of livestock farming. Producers must also find ways of making the most efficient use of available feeds, control disease and insect pests of livestock, and produce animals that will give the kinds of products demanded by the market. And they must be able to do these things efficiently enough to make a reasonable profit from their investment of money and labor.

Experience has shown us that we can improve efficiency in the production of food animals only as far as the genetic capacities of our livestock permit. Present efficiency in reproduction, for example, is apparently only about 70 percent. It is up to research to expand these capacities.

Research over the last few years indicates a real possibility of improving production characteristics of beef cattle through line selection. First, however, we must establish lines that differ uniformly in rate of growth and efficiency so that performance can be accurately predicted. It is estimated that the output per breeding unit can be increased at least 10 percent in the next 15 years through application of performance testing. As we learn more about inheritance, we may be able to go on farther than that.

In the South where livestock production offers an opportunity to diversify farming and increase income, farmers especially need animals that are more adaptable to the warm climate. Studies with crosses of Brahman and English breeds indicate the problem of adaptability to warm-weather conditions is not as simple as first thought. We still do not know how much depends on the inheritance of the cow, how much on nutrition, and how much on climate.

Somewhat similar results from research on Jersey-Sindhi crossbreeds raise the question as to whether we should give more attention to selecting within the dairy breeds for strains that are more heat tolerant.

Experiments in recent years have given conclusive evidence that diseases, parasites, and insects have an important bearing on growth and fattening rate of cattle and hogs. But we do not know nearly enough about the relation of host and infective agents in the development of disease or about the influence of season, temperature, nutrition, and other environmental factors on the expression of disease. We need new techniques for identifying latent infections or reservoirs of disease, so that we can prevent the build-up and spread of disease-causing parasites.

Another question for research is: Can we produce beef that will have enough intramuscular fat to make tasty, high-quality cuts without the waste fat on the surface and in the abdomen? And can we do it while, at the same time, increasing the use of pasture and forage roughage in the feed? We have some evidence that tenderness in meat is a heritable quality. But we have a long way to go in our basic studies before we can think in practical terms of breeding cattle that will provide beef of consistent tenderness.

So far, the only relation between feeding and tenderness that is well established is in fat deposition. Not only the type of feed but the animal's requirements for feed at various stages of growth may be important factors. For instance, a recent finding suggests that calves fed to make slow growth make better beef because the fat is more evenly distributed through the muscles. We also need a reevaluation of the role of calorie-protein ratios as they affect carcass composition and meat quality, as well as productivity and milk composition.

The problem of milk composition is already becoming urgent. Both medical scientists and human nutritionists are developing new knowledge on the relationship between a high fat diet and health. Consumers are paying more attention to the fat content of their foods. Among other things, they are buying more milk with part of the fat removed. This situation raises important biological research questions. Can we breed cows that will produce milk with more non-fat solids without increasing the highly correlated fat content? Can we develop feeds or feeding practices that will help do the job?

Problems in utilization and marketing of livestock products are just as numerous as they are in production. In many cases, they are just as difficult. As we increase the production of primary livestock products like meat, eggs, and milk, we must find profitable uses for the byproducts, such as inedible fat, hides, and feathers. For example, the utilization of inedible fats in livestock feed, plastics, and other products has provided additional profitable outlets for this animal byproduct.

Chemists can also help in developing improved ways of preserving primary livestock products and of converting them into storable form. One of our greatest needs today is a high-quality concentrated or dried whole milk that will retain flavor in storage for extended periods and reconstitute easily and quickly.

The goal of all our research on livestock and other food products is to provide the kinds and quantities needed to satisfy the nutritional needs and wants of people. Human nutrition research plays a vital part in reaching this goal. We need exact information on the nutrients the various foods supply, as well as the nutrients required by different individuals in the various age groups. Our present knowledge is far from adequate.

Questions on the function of fat in human nutrition present many problems. More information is needed on the composition of different fats, and human requirements or tolerance for different constituents. We need to determine the relationship of various kinds and amounts of fats to metabolism of other nutrients . . . to define the upper and lower limits of fat intake in various nutritional situations . . . and to spell out the dietary precautions needed when fat in diets is unusually high or unusually low.

I have raised only some of the questions related to the increased use of livestock products. There are a million others—dealing with every phase of agriculture and with every aspect of production and utilization of farm commodities. All of them are important, and many cannot be answered without research that will establish new biological principles on which to build.

I particularly want to make this point: Every discovery, every law of nature defined by any biologist in whatever discipline, can contribute in one way or another to agriculture, medicine, nutrition—in short, to human welfare. The science of biology—which started out as a study of nature by great naturalists—has grown into many diverse and specialized disciplines that include both the molecules of the soil and the complexities of the human being. They encompass all the life sciences, supporting physics and chemistry and, to an increasing extent, the social sciences as well. The next step will be the full development of the science of ecology, which will recognize the interrelationship of all these disciplines and tie them together.

Certainly one of the big jobs facing us today in agriculture is to pull together and to integrate the bits and pieces of knowledge developed in the various disciplines, so that we can find the missing areas and direct our research efforts toward filling in the gaps.

And this brings me to a problem that concerns all of us—regardless of our science discipline. I am referring to the increasing need for trained people.

Our colleges and universities each year are producing about 45,000 scientists and engineers, but, twice this number could be used. We need a thousand scientists each year in agricultural research alone.

There are many reasons for this situation, of course. But we can, and must, find ways to attract young people into scientific studies.

Biologists can help by bringing the need to the attention of colleges and universities in position to offer science courses and to offer special inducements to science students . . . by encouraging college employment officers to give preferential consideration to high school and college science students for summer work . . . by "selling" science—talking and writing about their work whenever and wherever the opportunity comes.

Of one thing I am certain—what all of us in the biological sciences do—the steps we take—to make our kind of work attractive to young people will determine to an important extent the direction they will take upon graduation. And, perhaps even more important, it will influence the direction our nation will take in meeting the challenges of the future. This applies to agriculture as it does to all other segments of our national life.

I am convinced that the problems of agriculture are unlimited. And I am equally convinced that the opportunities for biologists to extend the frontier of knowledge are also unlimited.

Trends in Microbiology

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I UNDERTAKE the task of predicting the most significant advances to be expected in microbiology in the future with great humility. As we look back over the past twenty-five or thirty years we can see that some interesting changes have taken place. I will not attempt to make a complete list but will mention five that are quite important and quite obvious. These changes seem to have followed more or less of a pattern. If these, and other trends continue it is possible to make some predictions about future developments. The trends to which I shall refer are: (1) improvements in instrumentation and methodology, (2) interdependence of scientific fields and specialization within fields, (3) increasing emphasis on team research, (4) sponsorship of research, and (5) an emphasis on fundamentals.

Instrumentation and Methodology

One obvious and striking trend is that toward more elaborate instrumentation. New tools have been developed and new techniques devised without which much of the advance we have seen and are to see would be impossible. This is in large part due to our adoption and application of methods and techniques and apparatus devised primarily for use in allied sciences such as chemistry, physics and mathematics. There is so much use of engineering skills that a new specialty, Biological Engineering, has developed. If this trend continues, and we continue to enlarge our armamentarium, our horizons will doubtless continue to expand. I wonder what Pasteur, who is reported to have advocated the "do it yourself" fashion in devising laboratory equipment would think if he were to visit any moderately well equipped laboratory of microbiology today. Most of this trend is good. Some of it is essential but in teaching I fear we may deprive our students of some valuable experience in handing them all their equipment, media and supplies on a stainless steel platter.

The Warburg respirometer was a curiosity in bacteriology laboratories only ten or fifteen years ago. Now it is a required apparatus for those who would be students of microbial physiology. The ultracentrifuge is an essential piece of equipment for those working with viruses. A few years ago only a few laboratories had one. Now there is one or more in nearly every institution.

The phase-contrast microscope has literally shed new light on bacterial morphology and cytology. The electron microscope, while not as recently developed as the phase scope, nor as common as the Warburg apparatus, has been improved, refined and simplified so that its usefulness is greatly enhanced. Nowhere in the United States are you more than a few hundred miles from an electron microscope should your studies require only occasional use of one. There is at least one investigator who is now taking electron microscope pictures in 3D! The latest development along this line is the Polaroid color translating ultraviolet microscope. There are only a half dozen in existence but they are installed at strategic spots across the country for convenience of any who can profit by their use.

The electrophoresis apparatus is remarkable in its simplicity, accuracy and usefulness to microbiologists. Micromanipulators for many delicate jobs are now available commercially for those whose interest makes the use of such apparatus desirable.

Cytological techniques have been developed to the stage where virologists, in particular, can use them most effectively. I would predict that in the future we will see much greater use made of cell and tissue culture techniques for viruses, bacteria and protozoa. Culture media have been improved to such an extent that most of the guesswork is taken out of growing bacteria.

The use of tracer techniques, using "tagged" carbon, phosphorus, sulfur, and other elements, has opened new avenues of investigation that have long been blocked by the lack of just such a method.

Another tool, still in its infancy and unfortunately available only to a few investigators, is the germ free animal. When such animals are produced in greater quantities, it will be possible to solve many problems that have beset us on our way toward understanding the most basic factors of infection and immunity.

This trend spells progress because without these instruments and techniques many of the developments that have been made and will continue to be made would not be possible. Still I think we should consider the words of James C. Clark[1] who wrote, "When

[1] Clark, James C., J. Eng. Educ., *23*: 764 (1933).

one visits the laboratories of famous universities hours are spent looking at elaborate machines, delicate instruments, special facilities for research, etc. But nearly always I have come away disappointed, feeling that I had missed the priceless thing, almost the only one that really counted, the spirit of great teachers and of such institutions in operation upon the minds and hearts of their students." To this I would add "researchers" because, I often conclude a visit to a research laboratory feeling that in some way the people there expect instruments to take the place of ideas and dedication of purpose. I do not think that robotry has come that far, nor do I expect that it ever will. As Charles F. Kettering said. "A research problem is not solved by apparatus, it is solved in a man's head. The laboratory is the means by which it is possible to do the solving after the man has the idea clarified in his mind."

Interdependence of Scientific Fields and Specialization Within Fields

This leads us rather directly to the second trait: Specialization and dependence of other specialists in and outside the field of microbiology on microbiology. More and more contemporary scientists who are not microbiologists are turning to microbes as tools in working out answers to fundamental problems. The biochemists are learning about protein synthesis and metabolic pathways by the use of bacteria. Knowledge of metabolic inhibitors, trace elements in nutrition, effect on virulence will be applied to the solution of many problems other than those in bacteriology. As we learn how micro-organisms resist, tolerate or become dependent on antibiotics the physiologists may make interpolations that will help to explain drug addiction and alcoholism, and the entomologists may be able to explain the mechanism of action of insecticides so that they can make better ones with the help of organic chemists. Marston Bates wrote in the *AIBS Bulletin* "The biochemists have discovered bacteria and the bacteriologists have discovered genetics." We can go even farther and say that the geneticists find the study of microorganisms time-saving and profitable. Microbes reproduce so rapidly that a bacterium can go through more generations in two years than man has since Adam. Indeed, microbiologists have made the better mousetrap and the world is beating a path to their door. The use of microbes by other groups presents an added responsibility to bacteriologists. They must see to it that these people have an acceptable working knowledge of basic microbiological techniques. If they do not—if they should work with mixed, impure or otherwise unsatisfactory cultures—their results may be misleading and worse-than-no-information will be disseminated. This emphasizes the importance of a good teaching program in microbiology. Courses in this field should not be reserved for majors but good introductory courses should be available to all students, early in their college experience. It is not unreasonable to suppose that properly organized courses in microbiology should be used to introduce biology to students of liberal arts, commerce, engineering and others as well as biochemistry and biology majors. What better material can be found than the ubiquitous microbes whose structure, metabolism, reproduction and importance to man can be demonstrated clearly and in such an interesting manner to everyone.

But this is not a one way street. There is a synergism between all biologists and a mutualism of all science. There can no longer be isolationists in science. We must not forget that bacteriology was once a branch of botany or pathology and we must remember that our dependence on them still is as upon the other branches of science.

Increasing Emphasis on Team Research

The demand for extensive specialization has had an inevitable effect on individualism in research. No one person can be expected to be proficient in all of the areas needed to reach a solution to many of our problems. Most problems now require considerable understanding not only of some phase of microbiology, but of biochemistry, physiology, genetics and physics. Thus it is that teams have been organized in so many institutions. The trend seems to be in the direction of more such teamwork research. These groups need well defined problems and objectives. Dr. Clarence Little[2] believes that medical research is still an intensely personal experience. He predicted that the cause and cure of cancer will be discovered by an individual working alone and not by a team of scientists working on a project. The weakness of organized research, he believes, is the fact that it does not support the dreams and hunches of an individual. Because of these pre-set objectives, much research is of necessity the applied type. Such groups have made important contributions to our knowledge and there is a definite place for them in our present scientific society. But does this mean that there is no longer a need for the lone ranger, the rugged individualist of the microbiological frontiers? Emphatically no! It is this lone investigator who is most likely to practice serendipity—the gift for finding valuable and agreeable things not sought for, a fortunate coincidence of intelligent insight and event. We cannot do without this independent investigator, the fellow whose responsibilities may include much routine teaching or administration, but who somehow finds time to do a little research on the side.

The proper balance between team research and independent research is impossible to define, but fortunately such matters do usually adjust themselves in a normal society. As in sports, so it is in research. Many men may contribute to the success of an endeavor but the world will hear of only a few. It was Dr. Roger Bannister who proved that man could run a mile in less than four minutes and his is the name that sports history will record. No mention will be made of his coach, trainer and those other runners who paced him for a quarter mile each. It takes individual effort and team work to make progress. In scientific discovery it is usually the other way. The individual makes the discovery and the group proves its value. Penicillin was discovered by a lone investigator. Twenty years later, after a "team" took over, the importance of the discovery was recognized. Neither could have made penicillin without the other.

Sponsorship of Research

The problem of freedom in research becomes pertinent to this discussion because of the *trends* in sponsorship of research. Should the sponsor suggest lines of investigation? Should he participate in directing the research? Should he regulate the publication of results of sponsored research? Some of these things are done by private sponsors. These attitudes are particularly evident in foundation-supported research where funds are collected and distributed for the support of research on specific diseases. It is done by federal agencies in order to stimulate progress in their specific field. It is done by industry because research and development of items based on the research is the life blood of industry today.

Restricted publication of results of sponsored research may be required to protect the individual, industrial, or national interests. Does it restrict unnecessarily the independence of an investigator? Undoubtedly it sometimes does, but this, more likely than not, is the exception. Is this also an infringement on academic freedom? We can't truly say so because its in the common good and if the common good were not also the good of private individuals, it wouldn't really be the common good.

Scientists have a greater responsibility to society than most people. Who but a scientist may do things that affect the lives of millions of persons all over the world? Think how limited would have been Sir Alexander Fleming's influence on society had he practiced medicine rather than discovered penicillin.

Legislative regulation of scientists is unthinkable because "it is only when the individual (scientist) is free to grow—to invent—to dream futures—and see visions that he will progress to the extent he seeks and deserves." This being the case the scientist must regulate his own life and avoid extremes of passion.

Emphasis on Fundamentals

Kipling gave us this rather pertinent little verse: "I have six faithful serving men. They serve me till I die. Their names are who and what, and when, and how and where and why."

I think I see a trend toward trying to find out *why*. A trend toward a study of fundamentals, if you please. For years the emphasis has been on making a better antigen, finding a new antibiotic, or establishing the role of a microbe in disease, or fermentation reaction. Now the scientists want to learn *how* the germ produces the disease, *how* the antibiotic works and *why* it does not work, or *what* it is about a certain protein or carbohydrate

[2] From an editorial in the Baltimore Sun, November 1950.

that makes it a good antigen. Certainly you will agree that metabolic diseases are better understood than infectious diseases. When a bacterium, virus or other agent is isolated from a case, or several cases, of a disease characterized by well-defined symptoms, it is said that the microorganism is the *cause* of the disease. It may fulfill Koch's postulates and all other tests. But is it? If so, why does it bring about the characteristic syndrome? Does anyone know *why* the pneumococcus causes lobar pneumonia or the T.B. bacillus causes tuberculosis? Why do some streptococci give rise to rheumatic fever or why doesn't *Esch. coli* cause dysentery while *Shigella* and *Salmonella* do? Does anyone know *why* a mess of corpses of bacteria previously injected into a host sometimes protect it from disease characteristic of inoculation with the living organisms? We *say* it is antigenic and that it stimulates production of antibodies. *What* do we mean?

Why does one strain of a given organism produce violent reactions in a host and another of the same species have no effect? We say it is virulent. But *what* is virulence in bacteria or viruses. This list could be extended with hundreds of questions about agricultural, industrial as well as medical microbiology. We define in circles.

Even though microbiologists often define in circles and sometimes use many Greek or Latin terms, most of them are thinking realistically. Perhaps it is because the biochemist and other scientists are watching us more closely or perhaps it is just because bacteriology is growing up. We are now examining more critically some of the concepts we accepted more or less by rote awhile back. One of these days we are going to learn *why* and *how* antigens work, *why* and *how* bacteria cause disease. With this knowledge, we will be able to do something *real* about our very *real* problems.

The Interest of Biologists in the WHO

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THREE specialized agencies of the United Nations Organization are intimately concerned with the utilization and therefore with the promotion of the work of biological scientists. They are UNESCO (United Nations Educational, Scientific and Cultural Organization), FAO (Food and Agriculture Organization) and WHO (World Health Organization). The role of these agencies in promoting international cooperation in applying the results of biological science research and in promoting current and future research is unfortunately not well known or understood, even by scientists themselves. One of the unfortunate consequences of the lack of knowledge and interest of American scientists in these U.N. Specialized Agencies is that they are forfeiting the influence which they could have in helping to shape United States policy with regard to support and direction of those potentially useful and important agencies.

Many times complaints are made that UNESCO is frittering away its resources in trivial or useless projects or that FAO and WHO are failing to approach their problems in realistic ways. Such criticism comes in bad taste from persons who have not made serious attempts to influence the work of those agencies. The ultimate responsibility for U. S. Government attitudes toward the U.N. Specialized Agencies lies with the electorate, which in turn must get its reliable information, on the basis of which it will form its opinions, from the American scientific community. Therefore the AIBS, as the largest and most influential organization of biological research scientists in the United States can have an especially important role to play in connection with opinion formation and policy formulation regarding American participation in these agencies. The United States is of course only one nation among many controlling their policies, but for good or ill its attitudes are extremely important in policy determination, perhaps because roughly one-third of the support of the U.N. agencies comes from the U. S. A.

The Editors of this *Bulletin* have invited a short statement concerning the current activities of the WHO and the significance of its present and potential future activities to biologists. I hope that in the near future similar reports will be made in the *Bulletin* concerning UNESCO and FAO.

WHO operates under a very broad constitution which charges it to promote the attainment of the highest possible health levels among all peoples of the world. According to its own statements its major functions are:

(1) A Specialized Agency of the United Nations created in 1948, WHO is the world's directing and co-ordinating authority on all international health work.

(2) WHO is the world's clearing house for medical and scientific information where health workers can learn of the latest discoveries and techniques and of the means to adapt and apply them in their own countries.

(3) WHO promotes and conducts research in the field of health.

(4) WHO sets specifications for pharmaceutical preparations.

(5) WHO administers the international aspects of the Sanitary Regulations governing world wide traffic by land, by sea and in the air.

(6) WHO assists governments to fight disease and to strengthen their health services in over 100 countries and territories.

WHO Facts and Figures, August, 1956

Operationally the policies of WHO are formulated by an annual World Health Assembly composed of Representatives of Member States, of which there were 81 in 1956. These policies are implemented by a Secretariat under the control of an Executive Board. The Secretariat operates through a headquarters staff and six regional offices. The latter are located as follows:

Western Pacific (Manila)
Eastern Mediterranean (Alexandria)
Europe (temporarily Geneva; from 1957, Copenhagen)
The Americas (Pan-American Sanitary Bureau, Washington)
South-East Asia (New Delhi)
Africa (Brazzaville)

Through its Central Technical Services the WHO provides a kind of world wide intelligence service concerning the incidence of communicable diseases. It has promoted a code of International Sanitary Regulations which has reduced prior confusion in this area. It promotes international cooperation in the standardization of drugs and has published the first International Pharmacopoeia. The Regional Offices have organized numerous demonstration projects in communicable disease detection, prevention and treatment.

WHO has begun to take a serious interest in nutrition, maternal and child health and mental health. It has also taken an active interest in medical and paramedical professional education as a necessary factor in improvement in health conditions.

WHO is operating in 1956 on a budget of $10,200,000 plus funds from the U.N. Technical Assistance Program and plus funds

received directly by such Regional Offices as the Pan American Sanitary Bureau, which itself received some $8,000,000 for its 1956 operations in addition to its allocation of $1,200,000 from WHO.

Considering the diversity both in tasks and in geographic responsibility of the WHO, it must be said that its budget is a very modest one and that a remarkable amount of good work has been accomplished with it. Since its formation WHO has been concerned most attentively to communicable disease control, a fact which stems apparently from two circumstances; first, that in many parts of the world such diseases as malaria, tuberculosis and syphilis are still major health problems, and second, that despite the broad aims of WHO as stated in its charter the majority of the delegates to the World Health Assembly have themselves been concerned more with the control of infectious diseases than with other disorders. Cancer, cardiovascular disease and neuropsychiatric disorders, which together constitute the major causes of death and disabling illness in countries like the United States, have not ordinarily been considered as public health problems in a technical sense and are not uppermost in the minds of public health officers. It is mainly from the ranks of professional public health officers that member nations in WHO have chosen their representatives. Thus it is not surprising that the lion's share of WHO funds have gone into communicable disease control.

It should be said, however, that significant sums of money are being spent on projects outside the realm of infectious disease control. For example, the Pan American Sanitary Bureau has budgeted $48,200 for 1956 for assistance to medical education in Latin America through the medium of scholarships for foreign study, visiting professorships, etc. Small appropriations are used by WHO for work in mental health. A beginning is being made in support of programs in nutrition in various parts of the world.

For the most part WHO has, and rightly so, conceived of itself as an agency concerned with assisting peoples over the world in applying known knowledge to the prevention, alleviation and cure of disease. The most legitimate criticism which can be made of its program is perhaps that it has not enlisted the support of the mass of the medical profession in the medically advanced nations because it has contributed so little to the problems that interest them most. A study of the reports of the work actually performed by WHO convinces one that such work has been much worthwhile. It has had the virtue of great urgency. The question is whether for the long term it would not be wiser to put a somewhat larger fraction of WHO and Regional Office funds into the future of health, even at the expense of doing less for the present generation.

Looked upon as an ethical question one is dealing both for today and for tomorrow with the salvage of human life. It is sentimentally more appealing perhaps to think of saving lives today, but one must also consider in a sound ethical decision the lives that might be saved in the future if more emphasis were placed on encouraging research and training for research in the medical sciences around the world today. It would be wrong, I believe, to criticize WHO for what it has done, because its work has been very valuable. One can, I believe, properly criticize it for what it has not done, but only if one is also prepared to help it get more funds to do a larger job. It is at this point that a greater understanding on the part of biological scientists of the actual and potential program of WHO becomes important, because informed public support for the program of WHO is a prerequisite to its development. In the United States the Department of State and the Congress can hardly be blamed for a lukewarm interest in WHO if the biological and medical scientists in the country are apathetic to its potential role in, for example, improving international cooperation in exchange of information, in indexing, in abstracting, in agreement on nomenclature, in setting uniform standards, in assistance in international congresses, in assistance in research programs which require or would be facilitated by international cooperation, and in a score of other obvious ways in which progress in biological science basic to health could be accelerated.

One small agency created and supported jointly by WHO and UNESCO, which is concerned with these problems, is the Council for International Organizations of Medical Sciences. CIOMS is intended to function for the medical sciences more or less as the International Council of Scientific Unions does for the natural sciences. It receives a subvention of $25,000 per annum from WHO and a smaller sum from UNESCO to assist international organizations in medical sciences with congresses, symposia, seminars, abstracting, indexing, standardization, etc. It has begun in a modest way to serve to carry out with their help important functions of both WHO and UNESCO. It has the virtue of being a voluntary organization of international unions, themselves private, non-governmental agencies. Thus it can bring into cooperation with the intergovernmental agencies, WHO and UNESCO, the rank and file of scientists in joint endeavors. Through it the International Union Against Cancer, The International Union of Geographic Pathology, The International Union of Physiological Sciences, among some fifty similar organizations, participate in international cooperation, but the extent of such work is severely limited by inadequacy of support.

In summary, WHO is carrying on a very valuable program utilizing the work of microbiologists, parasitologists, sanitary engineers, public health workers, administrators, teachers and nurses in all parts of the world. It is beginning to be interested in nutritional problems especially in their maternal and child health aspects, in mental disease, in caries prevention and also in basic medical and auxiliary health worker education. Considering the magnitude of its job, it is inadequately supported because it cannot, without damaging its urgent program of communicable disease control, promote other long-term objectives in the terms of its basic charter. International cooperation in improving the availability of biological and medical science information and exchanges of such information is a pressing need for the future of the health of the world. In a democracy decisions must be made by an informed public. The AIBS is in a strategic situation to influence public opinion and policy through information to the public in this and other questions about which biological science knowledge is prerequisite to informed opinion. Every thoughtful scientist knows that he or she is dependent upon the work of countless other scientists for the knowledge on which he or she builds in research. Our interdependence upon one another is a cardinal fact in scientific progress. In our preoccupation with our daily work we fail to make this fact known to our fellow citizens and we frequently forget it ourselves.

Finally may I suggest that we as biological scientists might contribute more than a little toward the achievement of a peaceful world if we were to devote more conscious effort to promoting friendly international cooperation with our colleagues all over the world in promoting both the prosecution and the utilization of research in the life sciences. Peoples are human under every flag and will not forever fail to see the realities of generosity and helpfulness, if they are genuine and significant. Where can more obviously significant mutual assistance occur than in the biological sciences fundamental to health?

The Application of Gamesmanship in Science

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FACED with an apparently interminable stack of examination papers which threaten to take up all the available research time for days to come, the scientist, who also teaches, must often wonder if there is not some easier way of "moving along" in the profession. Many expedients have been suggested, but few of them are really workable. Grading papers by throwing them downstairs, marking at random and adjusting the grades for those who complain, or simply not giving examinations, are devices which come readily to mind. All of these have certain drawbacks—and furthermore, they all fall short of the real objective of "moving along". They merely speed the professor back into the laboratory where he is faced again with an apparently interminable stack of specimens, miscellaneous undigested data, or uncompleted experiments. If the real objective of "moving along" is to be attained, the individual must systematically pursue this goal. He must not progress by a series of jerks and bounds, but press steadily forward. Pause not to look back, as Professor Challenger warns, but ever forward toward our "glorious goal".

What we need, if we have no philosophy to guide us, is a system. Fortunately for those of us who are not so gifted as to be able to think out our own, an almost infallible set of techniques has been suggested by that peer of English humorists, the late Stephen Potter.[2] In his book, *The Theory and Practice of Gamesmanship*,[3] which every thinking scientist should read, Mr. Potter outlines the general principles of his newly defined, but far from new, system. It may be encapsulated as the art of winning, or in our context "moving along," without actually indulging in *engañando*, as they say in Mexico.[4]

It is, of course, impossible in the short space of a single article to expound all of the possible uses of gamesmanship in science. We can only hope to outline the barest principles and hope that the reader[5] can develop them along lines fitting his own needs. We, therefore, content ourselves with brief discussions of two areas in which gamesmanship is immediately applicable to the situation of the college or university professor,[6] but which at the same time clearly illustrate most of the pertinent principles.

Publication

The emphasis upon publications, as a measure of academic worth, has become so great in recent years that the professor should seriously consider the problem. No fixed scale correlated with probability of advancement and promotion can as yet be established, but some tentative parameters may be set up. In large competitive institutions, an average of twelve papers a year probably represents a favorable balance for the individual. In smaller schools, less publication and more attention to other details may be indicated. Quality of the published work must be considered in connection with the desired ends. If permanent residence at a particular place is contemplated, the products should probably be of a somewhat higher calibre than if frequent and recurrent changes are appealing. Most deans apparently read only the titles; others simply count.[8]

Even the harried instructor of undergraduates can usually find time to grind out a few notes each year, but he should refuse to publish in the journal of any society which does not publish separate abstracts. This practice automatically doubles the apparent productivity. Great care should always be taken to see that some change in title is made before final publication. This confuses bibliographers no end, and assures the citation of both abstracts and final paper in later works. Never include too much in any one abstract, because you may find that you want to split up the final results into a series.

To maintain a really rigid production schedule, however, additional methods are usually needed. Joint publication with graduate students seems an obvious answer, but great care and tact must be used in practice. In American universities, the students, particularly the better ones, seem overly wary of any attempt to join them in authorship. If you insist upon your prerogatives, you may find that they are actually concealing their results from you until it is too late. Also the use of too much force may so prejudice your later relationships that you will be cut off from future revenue in the form of hints about good lines of experimentation, etc., etc.

If you are content with junior authorship, which in terms of gamesmanship is an acceptance of defeat, several rather mild but gamesmanly gambits may be worked. The "You can see what a fix I'm in here, Jones," approach may be enough to appeal to the filial instincts of many. Wear your old suit that day and don't be too careful about brushing the talcum out of your sideburns. Others are less malleable and more rigorous methods have to be applied.

Those who are fortunate enough to have more than one graduate student at the same time are doubly blessed. It is extraordinarily easy to keep a group at just the right degree of pique with each other so you can abstract the pertinent results from two or more projects and attach yourself as senior author. The junior authors

[1] *We must acknowledge the contributions of many colleagues to the material contained in this paper. Dr. C. B. Heiser, of the Dept. of Botany of Indiana University was particularly helpful in suggesting ideas and finding examples of their application. Others have asked to remain nameless.*

[2] *We are quite aware that Mr. Potter is not deceased. Assuming him to be so, however, allows one to make unstintingly flattering statements without appearing to curry favor, as it were. This particular technique was unwittingly invented by one of us recently in a book review (cf. Quart. Jour. Fla. Acad. Sci.,* 18(2): 125-127, 1955).

[3] *Henry Holt and Company. (New York) $2.75*

[4] *In the spirit of gamesmanship, the liberal use of foreign words and phrases in parts of scientific papers which are not strictly technical is to be highly encouraged. Here, for example, the bald English equivalent of "engañando" puts the whole subject in a bad light to many people. Small dictionaries containing many usable expressions and phrases can often be had in the 5 & 10 cent stores for from 25¢ to $2.00. In oral presentation, one should be somewhat wary if persons speaking the language are present; but in most American audiences any danger is negligible. Certain of the Tibetan and Chinese dialects are suitable even for great national meetings.*

[5] *We debated some time as to whether this article should be offered to the* **AIBS Bulletin.** *We understand that this publication may be available to graduate students* **before** *they have been granted their final degrees and thus removed from direct competition. Such practices are absolutely opposed to the basic concepts of gamesmanship. Students must be kept absolutely in the dark about what actually goes on until the last possible moment before they are thrust out into the marketplace.*

[6] *The frequent use of footnotes is a splendid example of how gamesmanship can be useful. It often so completely distracts the reader that he may lose sight of the fact that you are unable to sustain a coherent line of thought and may even lead him, particularly if he is young and inexperienced in such things, to believe that the paper concerned is of far more importance than it really is.*[7]

[7] *Footnotes to footnotes, however, should be used only in the most pressing circumstances. Insertion of a table is a possible alternative.*

[8] *This quantitative approach to academic values is firmly rooted in Pythagorean philosophy. English deans probably have an advantage over those in America since they have the possibility of correlating the number of letters after the man's name with the number of publications. Heavy covers for reprints are also suggested in case weighing may be resorted to.*

will seldom discover that you contributed absolutely nothing. They will believe that the ideas they did not have came from you.[9]

With only a single student, the problem is more difficult but far from hopeless. Be sure to insist that he submit all manuscripts intended for publication to you. Old data on experiments or observations you made years ago can always be produced. The matter of applicability is immaterial. Any such material available can be incorporated and then diligently edited out later. In the process of editing, these simple rules of thumb may be followed: (1) Compound all simple sentences; (2) Rewrite all compound sentences as simple ones; (3) Change "probably" to "it seems" and "it seems" to "probably" and so on; (4) Rearrange all paragraphs several times being sure to remember the original order if you do not trust your own finesse in such matters. After several such revisions, the suggestion that you be made senior author so you can help complete the paper, is usually completely acceptable. If not, do not give up before trying a few more revisions. Once the goal of senior authorship has been achieved, the original format and style can be restored. The only difficulty with this technique is that, unless you have a secretary, it may take longer than doing the work yourself.

A final suggestion in regard to publication is to begin a series. Others have pointed that there is no need to start with number one. In fact, a title such as, "Studies on the Regeneration of Cytochrome X in the Decapitated Chick. XXV." is in itself a thing of beauty to add to your bibliography. The addition of "Further" to the title seems to us redundant, however.

Impressing the Student

In some colleges and universities, the pernicious idea that a professor ought also to teach has become prevalent. In some extreme cases, promotion and pay are in part based on the teacher's success. The worst possible situation arises when some sort of student poll is used as a basis for judging teaching. We heartily condemn any such practice, for our collective observations clearly indicate that the students are invariably wrong in selecting "the most popular professor" or "the man who influenced our thinking most." No amount of condemnation will change some such situations, however, so a straightforward recognition of their existence and suitable countermeasures are necessary.

Space permits us[10] to mention only a few possible approaches to this problem of impressing the student. One easily applied technique is evident, however. In any course, be sure to select a text of imposing format and price, but at least ten years out of date. Then, prepare all lectures from the most-up-to-date texts available; but be careful to keep these checked out of the library, and never mention their existence to the students. This leaves the indelible impression that you are really "on your feet," "right in there pitching", and a real "hot shot".

Those who feel that the use of gamesmanship against the students is unethical should remember that even in those schools with the smoothest honor systems, it is said that the professors have the "honor" and the students the "system". We are merely suggesting that the professor adopt a system also. Anyway, it might really improve your teaching if you read the latest textbooks.

With these few hints on the basic principles and applications of gamesmanship, we leave you to your own devices. Now, back to the bluebooks. . . .[11]

[9] *Disavowal of all seniority of authorship in a footnote at the beginning of a paper is approved in cases where all else has failed.*

[10] *This is an excellent device for implying that you know a great deal more about a subject than the parsimonious editors will allow you to present.*

[11] *Gamesmen consider it poor taste to discuss their own achievements; and the reader is, therefore, not entitled to know how the order of authorship was established in the present case. Suffice it to say that the junior author did not prepare the illustrations.*

The Role of Statistics in Land Grant Colleges

BOYD HARSHBARGER

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A DEPARTMENT of statistics and a statistical laboratory in a land grant college play the triple role of promoting research, providing consulting services, and training professional statisticians. There currently are four or five such departments and laboratories in the United States and also a number of land grant colleges that perform similar services without the central organization of a department. Other land grant colleges provide statistical consulting services with a modest program of instruction in statistics. Statistics is playing an increasingly important role in all kinds of research, and its formal extension into new colleges is only limited by the lack of trained personnel. During the past year, six to eight institutions have been actively formulating plans for ambitious programs in statistics.

Almost all phases of modern experimentation are dependent upon the statistical design of experiments or surveys and the statistical analysis of the data. Modern statistics received its greatest impetus with the research work of R. A. Fisher, who first provided methods for handling the analysis of small samples. Prior to his work, most statistical methods depended on large-sample theory and required the collection of greater masses of data than was practically feasible in most types of research. Simultaneously with Fisher's study of small-sample theory, Sewell Wright and others were developing the basic concepts of mathematical genetics and biology that have led to much agricultural experimentation dealing with livestock and animal breeding. The contributions of Fisher and Wright along with those of Cochran, Neyman, and Wald to the mathematical treatment of experimental data have been supplemented by a vast amount of research done by increasingly numerous contemporary scientists.

Beginning with the Second World War, statistics began to play an increasing role in engineering and industrial research. Some of the particular phases of statistics now used widely in engineering research are control charts, sampling, analysis of variance and stochastic processes. Many intricate problems in industrial research are now also making use of the design of experiments. The assumptions underlying many of these designs are many times more easily met in industrial research than in biological science.

One of the functions of the statistical laboratory is to contribute towards research in the basic methodology of statistics. In order to become increasingly better able to cope with the problems that arise through consultation on experiments, the statistical laboratories of several institutions have contributed greatly to basic research in statistics and their reputations are widely known both in this country and abroad. Some of the research of the laboratories is directly sponsored by experiment stations, but much of it has been financed by contracts with various federal agencies and private institutions.

The second major activity of the statistical laboratory is that of providing consulting and computing services to members of experiment stations. The laboratory performs the routine analyses of designed experiments for field trials and laboratory work conducted by research workers. In addition, consultation is provided on the design of experiments. In some cases, this involves determining the most suitable field plot layouts or the arrangements for industrial designs. In others, consultation may require work in statistical methodology needed to suit the needs of particular research problems which are sometimes of a very specialized nature. This may necessitate the development of new statistical theory or the adaptation of existing techniques to suit special problems. It is in services of this kind that the statistical laboratory most directly meets the needs of research workers, although this service should not be regarded as being of more importance than the actual development of basic statistical theory.

The computing laboratories analyze data from experiments or tests and assist the research workers in drawing conclusions from the results of their experiments. The analysis of the data includes the basic computations needed to apply statistical techniques and apply the introduction of probability concepts in evaluating conclusions. In the process of drawing conclusions from experiments, the statistician indicates how well the results support the objectives of the experiment, the gain in efficiency that might be expected from the use of different designs, and in general, indicates the best statistical methods and designs for furthering better research. In many experimental results, the data can be combined with the results of future tests to give a more powerful method of analysis and in doing so arrive at significant results in a shorter period of time. If the experiment has not been well designed, the statistician can at times help the research work in salvaging some of his results, but in most cases, he can only point out the proper procedure to be followed in future experiments.

Apart from the direct services to the experiment stations, both agricultural and engineering, the statistical laboratories provide computing and consultation services to other groups within the colleges and universities, to other agencies of the states, and to independent groups through contract arrangements. The statistical laboratories cooperate with regional groups in the design and planning of surveys for marketing research and other regional research. They have accepted the responsibility for the analysis of data from these surveys and the summarization of the results.

The agricultural extension services at one or more colleges recently have provided funds for the part-time services of statisticians to consult and help direct the surveys that are conducted by these divisions. Methods are under study to provide assistance in evaluating the efficacy of various methods of disseminating agricultural information to farmers in the states. It is expected that these studies will lead to improved methods of publicizing improvements in agricultural practices.

The science of statistics is still in a stage of tremendous growth, and each of the increasingly numerous applications of statistics presents new theoretical problems and the need for further basic research. An early awareness of this need has allowed statistical laboratories to expand and to gain recognition. Both agriculture and industry are beginning to realize the importance of statistics, the need for statistical consultation as well as the need for basic research in theoretical statistics. Some of the topics in basic theoretical research which the departments of statistics and statistical laboratories have sponsored are in experimental design, nonparametric tests, sampling, statistical inference, sequential methods, statistical estimation and stochastic processes.

Departments of statistics currently existing in colleges and universities are designed to provide (i) a well-balanced curriculum for the M.S. and/or Ph.D. degrees in statistics and (ii) an adequate introduction to statistical theory and statistical methods for the undergraduate and graduate students of other departments. Special efforts are made to fit the latter courses to the needs and objectives of the particular groups of students concerned.

Graduate programs are usually open to both men and women with a satisfactory background in mathematics. As a rule, a minimum of one calendar year is required for the M.S. degree in statistics. The course of study leading to the Ph.D. in statistics consists of a minimum of three years of graduate work and a dissertation demonstrating the students' ability to do original research.

Some of the best qualified students in statistics have come from applied fields such as biology, engineering and economics. Since this type of training makes the student aware of the potential application of statistics, he can, upon receiving his degree in statistics, become an able consultant. In general, he will thus have an excellent appreciation of the appropriateness of mathematical models, and at the same time he will be able to sense the limitations of these models in biological or engineering applications. This feel for the application of statistics is sometimes lacking in people whose training has been entirely in mathematics and in theoretical statistics. The great difficulty experienced by many biologists entering graduate work in statistics is the lack of mathematical training. Biologists contemplating entering this field should have at least a course in calculus or, better, a course in advanced calculus. Engineers usually do not have this limitation in mathematical training. Both biologists and engineers, in addition to course work in mathematics, should have an aptitude for mathematics before attempting a doctoral program in statistics.

Students with undergraduate training in mathematics are now the chief source of students entering graduate work in statistics. Some of these are handicapped by a lack of experience in the application of statistics, but, in general, this will not be the case if the school where the statistician received his degree devotes part of his training to statistical methods and not only theory. History has shown that when a theoretical statistician develops an appreciation for a particular field of application, he will generally make a bigger contribution to statistics than one trained primarily in the applied field.

To give some idea of the courses taken by a student doing graduate work in statistics, a list of the courses most commonly included in statistics curricula is given below:

Sampling Methods, Experimental Designs, Statistical Methods, Theoretical Statistics, Econometrics, Statistical Inference, Theory of Least Squares, Probability, Engineering Statistics, The Statistics of Biological Assay, Correlation and Contingency, Multivariate Analysis, Theory of Sequential Methods, Theories of Statistical Inference, Analysis of Variance, Rank Order Statistics, Theory and Application of Stochastic Processes.

The demand for trained statisticians by industry and colleges exceeds the demand for other scientists including even engineers. The salary scale is correspondingly higher. Engineers, chemists, as well as biologists, who have taken several courses in statistics usually draw higher salaries than those without such formal training.

The plan which has been summarized in this paper has been successfully followed by the Department of Statistics and Statistical Laboratory of the Virginia Polytechnic Institute. Its success may be judged by the fact that this department now has ten full-time staff members and twenty-nine graduate students, many of whom are assisting the program both in teaching and research through fellowships. However, a college should not feel that a staff as large as the one mentioned is a necessity for starting a department. At the Virginia Polytechnic Institute, the program was initiated with only two statisticians. One of the prerequisites, however, in beginning a program is a separate organization rather than the assigning of statisticians to an existing department. Several statistical programs have failed recently because they were assigned to a certain department of a college. In general, the statistician assigned to a department, which may be agronomy, biology, economics, mathematics, etc., has his loyalty as well as his interest in that department and fails to give sufficient consulting time to problems in other areas. The budget in such cases also offers insurmountable complications. Some experiment stations have overcome this by making the statistician directly responsible to the director of the experiment station. This is to be recommended if a separate department is not feasible. If instruction as well as consulting is desired, a separate department, or at the very least a separate section within a department, seems to be the only answer.

Canal Zone Biological Area

J. E. GRAF

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CLOSE by the western side of the Panama Canal and about midway of the Isthmus lies Barro Colorado Island, better known to many scientists as the Canal Zone Biological Area. Formerly it was a hill bordering the Chagres River Valley, but the filling of Gatun Lake inundated its lower slopes until only the top, a small island, remained. In 1923 this island was reserved for scientific purposes by Governor J. J. Morrow. It was first administered by the Institute for Research in Tropical America, then an agency affiliated with the National Research Council. In 1940 Congress authorized the setting aside of an area within the Canal Zone to preserve the natural features for scientific study, and this gave permanence to the Biological Area. The sum of $10,000 was authorized for expenses connected with administering and maintaining the Island and its facilities, but funds were not appropriated. In 1946, by a Presidential reorganization order, the Canal Zone Biological Area became a bureau under the administration of the Smithsonian Institution.

The length of the island is 3.4 miles, its width 3.1 miles, and, while roughly circular in shape, its borders are so deeply indented that the shore line measures over 25 miles. The elevation at shore line is about 85 feet above sea level, and the highest point on the island 537 feet. Except for the small laboratory clearing, the island is covered with a virgin tropical rain forest. The heaviest annual rainfall on record was 143 inches in 1935 and the lowest 76 inches in 1930; the average for 30 years is 106.82. The dry season occurs in January to April, inclusive, the average total rainfall for this period being almost 7.5 inches. The heaviest monthly rainfall occurs in October and November.

Access to different areas is over trails well posted in 100-meter lengths so that the traveler knowing the trail name and distance is able to pinpoint his location on a chart. So well are the trails laid out that they do not interfere with the natural character of the forest, and yet they may be followed easily if the traveler is attentive. One venturing out on the trails will soon discover that the old mountain top is far from level, and while the distance is short across the island it provides a good test for the average hiker. If one pauses at intervals and remains quiet for a while, many of the animals become curious and close in around the hiker where they can be seen to good advantage. Small buildings were constructed at the terminus of five trails for testing the value of termite-proofing lumber. Unfortunately not all these treatments were successful over long periods, and so at the present time only two of the houses are habitable. These two now serve as temporary camps for scientists who wish to study varying environments. When a large stock of supplies is required for a prolonged stay in one of these trail-end houses, the material is transported by boat.

Launches coming to the island from Frijoles land at the dock at the foot of laboratory hill. Service buildings and shelters are located near the dock, from which a stairway of 200 steps leads up to the main laboratory building. This is the "front" building, seen clearly from the Canal. Surrounding this building are ten others of varying sizes which contain laboratory and dormitory space, the kitchen and dining areas, the library, specimen storage, the index to plants and animals, and storerooms. One building, constructed by the Eastman Kodak Company, is used for their corrosion and deterioration tests and workshops.

With the addition of some dehumidifiers and dry closets, facilities will soon be available for protecting supplies, materials, and equipment from fungus attack. This will permit the steady addition of certain items of laboratory equipment which are generally used. Scientists requiring specialized equipment will have to continue to furnish it.

It has been the policy of the management of the C.Z.B.A. from the beginning to make available to scientists a healthful environment with safe drinking water and freedom from malaria. It has also been the aim to provide at reasonable cost meals and modest,

but comfortable, lodgings. With the provision of these things the scientist can spend his full time in researches with the knowledge that in such circumstances he is sacrificing neither his health nor his comforts. The resident naturalist spends a large portion of his time on the island and has plans underway to conduct a long-term research program with emphasis on population dynamics, breeding cycles, and the general ecology of birds and mammals of Middle America. In addition, he makes special efforts to provide research workers and science students with ecological data and advice, to help make their investigations of maximum value.

Whether the visitor is a zoologist or a botanist there will be found on the island much worthwhile research material. Stanley has listed over one thousand species of trees, shrubs, and herbaceous plants for the Area. The trees are thoroughly intermingled and do not grow in pure stands of a single species as they commonly do in the Temperate Zone. The largest tree on the island, *Bombacopsis*, grows to great heights, and its heavy trunk is braced by elevated, buttressed roots. Cecropias of several species occur, and the balsa tree with its huge flowers is always interesting but especially so when monkeys are feeding at the flowers. Other trees include roble, almendrado, espave, and the valuable hardwoods nazareno and palo santa. The lianas, the dangling stalks of climbing vines with their tops high in the trees, also attract considerable attention.

Animal life on the island is even more spectacular than the plants. Over 250 species of birds have been found there, including several species each of toucan and parrots. Others include motmots, oropendulas, guans, Ghiesbreght's hawk, blue tanagers, honeycreepers, and brightly-colored hummingbirds.

Some 53 species of mammals are found on the island, including tapirs, deer, peccaries, agoutis, sloths, anteaters, coatimundis, and four species of monkeys, of which the black howlers and capuchins are of common occurrence. The ocelot and puma, while not having been seen, have been photographed at camera traps at night.

Of other animal life, insects are legion and night collecting at lamps brings good catches of many colorful and unusual forms. Twenty-one species of snakes are found on the island, of which four are poisonous. Snakes are seen infrequently and some of them are quite rare.

This readily accessible site, which provides excellent opportunity for tropical biological research, has attracted many scientists over the years and from their investigations about 635 notes and papers have been published. These fruitful studies bear out the statement made by the late Dr. Frank M. Chapman, veteran island scientist, after the island laboratory had been in operation for fifteen years. On that occasion he said, ". . . the 4,000 acres we know as Barro Colorado have contributed more to our knowledge of tropical wildlife than any other of similar extent in America—perhaps in the world."

The Institute of Fisheries Research, Barcelona, Spain

F. G. DEL CID, *Director*

IN 1943 the formation of a Fisheries Research Institute was authorized by the Superior Council of Scientific Research of Spain, and the author was appointed Director. To train the specialized staff needed for the work of the Institute, short courses were given in the Department of Zoology of the University of Barcelona. These courses were on the theory of the marine bios, methodology and techniques of fisheries research, marine plankton, and analytical chemical methods. The practical aspects of the courses were undertaken at Blanes, a Mediterranean port, where the local fishing fleet was utilized by the classes.

Upon completion of the courses, the staff was distributed to three stations: one at Blanes (Gerona); the second at Castellón; and a third at a new laboratory at Vinaroz.

Our primary interest, from the beginning, has been the problems of the fishing industry of the northwest part of our Atlantic coast. There, fishing is of great economic importance. For this reason it was decided to establish a laboratory somewhere on the coast of Galicia. The Ministry of National Education turned over to us an attractive building adjoining the fishing port of Vigo, and on July 12, 1951, we took possession.

The administrative and central building of the Institute of Fisheries Research, however, is situated in the fishing section of Barcelona, known as Barceloneta, between the port and the open sea, on a 64 by 40 metre tract of land. This building is still under construction but should be ready for occupation shortly.

The basement area is occupied by depositories for the sedimentation of sea water, work rooms, and areas for service machinery. The ground floor is being fitted as an aquarium and fish museum, both open to the public. The first floor will be taken up by Institute laboratories and the second floor will provide living quarters for Spanish and foreign visitors who wish to study at the laboratory. A lofty tower dominates the building; on its roof meteorological equipment will be placed.

The public aquarium has 155 square meters of exhibition tanks and, when completed, should rank high among the important aquaria of the world. It is built in the form of a star, following the plan of the Chicago aquarium, since we believe this to be a most advantageous design. The museum has been designed in the most modern manner so the instructive and interesting aspects of marine biology may be shown to advantage.

The laboratory floor of the building is divided into three sections; one devoted to the studies of fisheries, a second to marine biology as applied to fisheries, and a third exclusively designed for chemistry as applied to fisheries research.

A special ship has been equipped for marine studies and it will go into service about the time that the building is dedicated. With it we hope to obtain material that will confirm our theories about the productivity of the ocean and its cycles—theories based on data obtained up to now on a smaller scale by the staff of our Mediterranean laboratories.

To complete the work of coastal research installation, we hope to later build a laboratory in the fishing port of Cadiz, where the conditions in the vicinity of the Straits of Gibraltar may be studied.

During the first five years of activity at these various stations, we have begun work on: (1) the environment in which fish develop; (2) monographic studies of species of commercial interest and of those fish that could become commercially important; (3) technical-economic studies about fishing methods, intensity, and income; (4) a study of molluscs, seaweeds and other products of the sea which could become more important commercially and scientifically.

(1) The classical methods of investigating the enviroment have been supplemented by newer techniques which give results more quickly and with greater accuracy, especially in plankton treatment. The ship based at Vigo has allowed us to initiate hydrographic studies of that region while the generous collaboration of

Model of the Institute of Fisheries Research, Barcelona, Spain.

fishermen has supplied valuable data about Mediterranean waters. We are now in possession of excellent collections of plankton material. Our studies have shown us that the production of phytoplankton is very low on the Mediterranean coast, practically limited to the period from December to June, and related to the intensity of upwelling (which varies yearly as a function of the winds and temperature). The temperature of the surface water is an excellent indicator of the upwelling, for when the water is colder (due to upwelling), the productivity is greater. The production of phytoplankton varies from one year to another as much as 1:2; this factor is very important to the survival of fish. We have also studied the range of production in the estuary of Vigo and have discovered that it is at least ten times greater than in the Mediterranean waters and in many ways independent from the production of the adjoining Atlantic waters. In Vigo the productivity is less bound to the seasons and variations appear to be related to the tides. In that particular estuary there is year round food for fish and molluscs.

(2) Our monographic studies have been prepared for all species of commercial interest, especially: pilchard, anchovy, shad, sprat, common mackerel, horse mackerel, common bonito, tuna, hake, red mullet, whiting, black sea bream, common sea bream, pickerel, axillaris bream and ox-eye. These studies have been most complete since considerable amounts of material were available from many different regions. Included are data about developmental patterns, reproduction, foodstuffs of species, and factors about the life cycle and habitat as they vary from location to location.

(3) It has been found necessary to improve the statistical methods applied to fisheries studies. The composition of the fishing from area to area, the influence on the catch of various mesh size of nets, the effects of different types of motors and ships have all been studied. In Castellón, special attention has been given to a study of the efficiency of unified efforts in commercial fishing.

(4) Oyster research, including studies of habitat conditions, development and reproduction, has been carried on in the estuary of Galicia. With the application of improved techniques the oyster has flourished and the repopulation of the estuary of Vigo is now being carried out at half industrial scale. The mussel and prawn have also been studied in an effort to clarify their biology. Research is also underway on marine organisms (borers) who attack submerged wood, the control of dolphins, methods of conserving nets, means of ascertaining whether fish have been killed by explosives and the chemical composition of fish and molluscs.

The systematic determinations of salinity, oxygen and phosphate concentrations of sea water have been initiated and technical improvements of methods are being investigated. Studies are also under way on the dissolved organic substances and finely diluted particles in sea water, and on methods of determining the grade of freshness of fish. In the estuary at Vigo, for the first time, we are applying new methods of determining the sedimentation and deposition of organisms. In the zones of fast sedimentation, a chronological register of the changes in the estuary can be established. In this way the relationship between ecological changes and the oscillations in abundance of the pilchard can be correlated.

The research results of the laboratories have been the subject of over eighty publications. Most of these papers have appeared in "Publicaciones del Instituto de Biologia Aplicada" (Publication of the Institute of Applied Biology) and a new journal, recently established by the Institute, "Investigacion pesquera" (Fishery Investigation). This latter journal is now the official publication of the Institute and two issues have appeared to date. The Institute has published two books, "Introduccion al estudio del plancton marino" (Introduction of the Study of Marine Plankton) and "La pesca en Espana. I. Cataluna" (The Fishery in Spain. I. Catalonia).

ATTENTION ALL PHOTOGRAPHERS . . .

Beginning with the January 1957 issue the AIBS *Bulletin* will be printed in a new three-column format. Other modifications in style are planned and among the suggested changes is that of having cover pictures. The members of the Biological Photographic Association (an Affiliate AIBS Society) have been approached about submitting suitable photographs. We will also be happy to receive photos from other members of AIBS. Photographs should be arresting, different or illustrative of some new biological phenomenon. The AIBS will not be responsible for damage in transit. Material not accepted for publication will be returned to the sender. A brief description of the photograph should be included with the photographer's name and address.

The Sagehen Creek Experimental Wildlife and Fisheries Project

PAUL R. NEEDHAM, *University of California*

RESEARCH on wildlife and fisheries problems must be done largely in the field. Macro-habitat conditions at least, cannot be duplicated in the laboratory. Investigators in these areas of study long ago recognized the need for field facilities of either a permanent or temporary nature. Trailers, buses and portable cabins have often been used for short term studies. Stations like the Hunt Creek Fisheries Experiment Station operated by the Institute for Fisheries Research of the Michigan Conservation Department at Lewiston, Michigan, or the Convict Creek Experimental Station near Bishop, California, are usually larger, more permanent, and offer more complete facilities for long-term research. In areas of severe climate at least, research personnel doing year-round work, cannot nowadays be expected to live in tents pitched in the open.

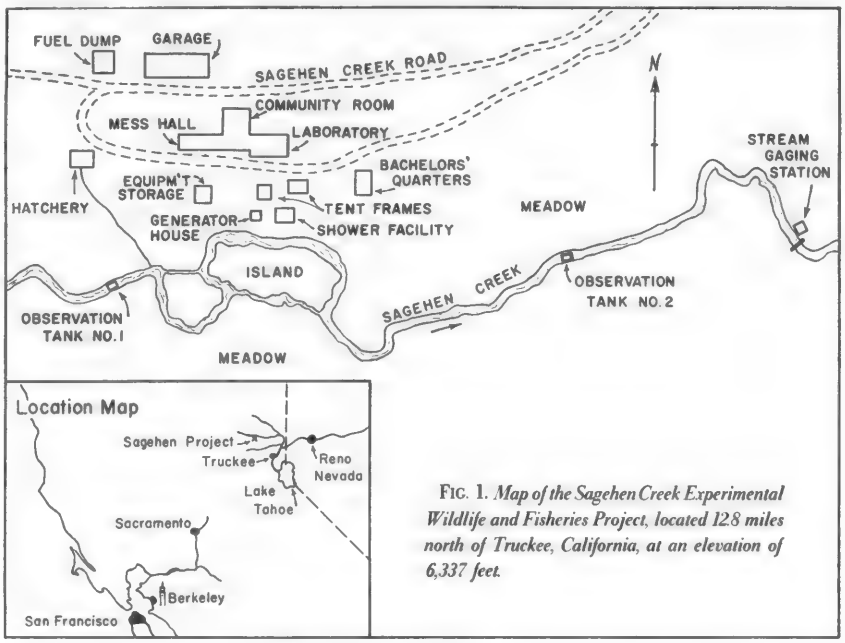


FIG. 1. *Map of the Sagehen Creek Experimental Wildlife and Fisheries Project, located 12.8 miles north of Truckee, California, at an elevation of 6,337 feet.*

The University of California administration recognizing the need for a high mountain field research center for use of faculty, graduate students and teaching in the fields of wildlife and fisheries, in 1951 authorized construction and research to be started at what is now called the "Sagehen Creek Project".

The site finally selected for the station is located in the Tahoe National Forest on upper Sagehen Creek, 12.8 miles north of Truckee, California (Fig. 1) at an elevation of 6,337 feet. Since the land on which the project is located was entirely in the ownership of the U. S. Forest Service, a Cooperative Agreement was drawn up which permits the use of about 112 acres of land and 1.25 miles of stream for an indefinite period of years. The selection of Sagehen Creek came only after an extensive reconnaissance of a large part of the various drainages of the state in 1950. The necessary prerequisites of a fairly small, controllable stream in an area of normal public use and vulnerability to severe winter conditions were found there. The average annual snow pack is about 44 inches but in the exceptionally heavy winter of 1951-52, the pack was 110 inches. An additional point in favor of the Sagehen site was the fact that this basin is in excellent shape with respect to soils, timber and general ecological conditions and offers many favorable opportunities for research on wildlife, fishery, and other biological problems. The area is entirely forested except for a few meadows along the stream. The dominant trees consist of Jeffery Pine, white and red fir, with much lodgepole in the wetter areas.

Sagehen Creek is fed by springs at its head and snow melt. It fluctuates from around 50 cubic feet per second in the spring snow melting period, to about 2.0 c.f.s. in September. Being small, the stream lends itself well to pumping and draining techniques used in sampling fish populations and for the operation of two-way fish traps.

Facilities

Construction at Sagehen was started in June of 1951. Through the summer of 1955, the following facilities had been completed: two tent frames, mess building, community room, workshop, laboratory with work space for eight students, electric generator house, fuel storage building, aquarium-hatchery building, garage, bachelor's quarters and a sanitary facility for summer use only. A darkroom is available in the garage. A 44° F. spring flowing 40 gallons per minute, supplies water by gravity to the Project for research and domestic uses. A phone line was constructed in 1953 from Hobart Mills into the project headquarters, a distance of 5.8 miles. This is essential for protection of personnel, especially in winter when the roads are closed. As further protection for personnel at this season, a second garage was built in 1955 at the junction of the Sagehen Road with State Route 89. The latter road is kept open in the winter while the Sagehen Road is not and a small Sno-Cat was purchased for winter snow travel over the

FIG. 2. *Underwater observation tank at the Sagehen Creek Project. Rock racks at each end counteract buoyancy. The tops of two of the viewing windows show just above the water surface. The rods in the pool hold thermocouple stations in position for temperature studies. Access is by ramp at right of photo.*

two mile section from the station headquarters to Highway 89. A survival room was built in the garage there and a telephone was installed. Sierran winter storms are extremely severe at times and these items are essential for protection of staff dwelling at Sagehen in the winter.

The present capacity of the station will permit housing and feeding of twenty persons in the summer and six in the winter. The mess, laboratory, community room, and bachelors' buildings are completely insulated and winterized for year-round use. Sleeping accommodations for summer use are provided under canvas on wooden tent frames. Since there are many excellent camping sites available on the stream, many students as well as faculty members often camp out in summer.

Research Program

The main research effort at Sagehen is directed to long-term basic ecological studies of the factors governing the distribution and abundance of fishes. Ten separate sampling stations have been established over the 10 miles of stream and once each year these are pumped and drained, the fish counted, weighed, measured, and returned alive to the same section of stream from which they were removed. The 1955 season completed the first four years of sampling and analyzing these sections. Correlation with weather, stream flows, temperatures and other factors is being made but publication of the results will not be made until at least a minimum period of five years has been covered.

A second segment of the research program is concerned with winter studies. These constitute a broad expansion of winter studies begun in 1951 at the Convict Creek Experimental Station operated by the U. S. Fish and Wildlife Service near Bishop in eastern California. The main effort here is to identify and to measure the main factors involved in winter mortalities of stream fishes dwelling in high montane streams. This work was started over the winter of 1953-54 and winter studies are now a regular part of the Sagehen program.

In order to provide facilities for direct underwater observation of fishes, ice formation and dispersal, and thermocouple stations, two steel underwater observation tanks have been placed in the stream bed. The larger of these is placed in a fixed position in the stream bed and since some 5,000 pounds of rocks in racks at either end counteract buoyancy, it cannot be said to be portable. Four 15 x 23 inch plate-glass windows, two on each side, provide observation posts (Fig. 2). Thermocouple stations are set in various positions in the air, water and stream bed outside the tank. These copper-constantan thermocouples are attached to a selector switch and an ice bath standard inside the tank. A lead-covered cable runs some 400 feet from the tank to the laboratory where it connects with a potentiometer. Thus, two workers are required—one to make the observations in the tank and to select the stations where observations are being taken, with another in the laboratory to record the readings from the potentiometer. Telephones connect the laboratory with the tank.

The smaller, more portable underwater observation tank was installed in a riffle in the fall of 1955, where anchor ice forms abundantly. A cable from this tank also feeds into the potentiometer in the laboratory. Five thermocouple stations are operated at this tank as follows: (1) air, (2) water, (3) 12 inches in the gravel for ground water temperatures, (4) air-anchor ice where the thermocouple is alternately covered by anchor ice or exposed to the air, depending upon climatic conditions, and (5) solar radiation. A flat-plate, Gier and Dunkle radiometer is used for measurements of solar radiation above water. Below water radiation will be measured with a specially designed solarimeter recently developed on the Berkeley Campus by Professors Joseph Gier and R. V. Dunkle in Engineering.

Students have aptly termed the underwater observation tanks the "deepfreeze", and it is just that during sub-zero weather. An observer, even though heavily clothed, can stand only about 45 minutes lying in one of the tanks before he will have to return to the station headquarters to thaw out. Litter blankets and air mattresses help to reduce the chill and hardship but, even so, this kind of field work is strenuous to say the least.

Administration

The Sagehen Creek Project is administered as a regular division of the Zoology Department on the Berkeley Campus under what is termed the Zoology-Fisheries section. To July 1, 1956, the sum of

nearly $100,000 had been expended on both the facilities and various branches of the research program at Sagehen. Of this amount $30,000 was provided through the generosity of the Max C. Fleischmann Foundation of Nevada in June of 1953.

Graduate Student Research

Graduate students continue to form the "backbone" of this project. In the past various students have assumed responsibility for the summer field work but in June of 1956, Richard Gard, a full-time Graduate Research Zoologist, was appointed to direct all research there and to administer the project.

To date, five Masters and four Ph.D. degree theses have been either partially or wholly completed by graduate students doing their field work at the project. Subjects of these theses include: "Age and growth of sculpins", "Composition and distribution of fish populations in Sagehen Creek", "Population fluctuations of small mammals and sooty grouse in California", "Utilization of food by beaver", "Beaver-trout relationships", "Chironomids dwelling in *Nostoc*", "Food of sculpins", and "Cycles in fish populations".

The Sagehen Creek Project is providing a sort of "pilot" plant for testing new approaches and techniques to ecological field problems. Future plans call for the development of a long-term cooperative study of the effects of different types of logging practices on stream flows, siltation rates and other factors. The Sagehen Creek basin has been logged off twice, once around 1885 and partially again in the early 1900's. Logging will probably be resumed again within a few years and when it is, a long-term instrument record of basic biological and physical factors will be available from the period when no logging occurred for comparison with conditions brought about by, or subsequent to, logging operations.

No cattle are grazed in the basin but one permit is granted by the Forest Service for several hundred head of sheep. These are held largely in old forest burns and meadows at the head of the basin. While grazing of these animals has probably increased erosion to some extent, no serious damage is yet apparent to either the stream or its substrate.

The establishment of such stations is essential to progress in our knowledge of the basic, controlling factors involved in the struggle for survival under natural conditions. The federal, state, or institutional investigator working on fish and wildlife problems is largely dependent upon data collected in the field. Where long-term investigations are concerned, he must be provided with a decent roof over his head, adequate equipment, and sufficient time to do a proper job. "Facts, like pine trees, take not only rain but time." (Leopold)

A.I.B.S. Governing Board Report, 1955-1956

HIDEN T. COX, *Executive Director*

The AIBS Governing Board held its 1956 annual meeting at The University of Connecticut on August 25 immediately before the annual meetings of biological societies. Representatives of 15 Member Societies, 8 Affiliate Societies, and 4 Associates were present. In addition there were a number of observers from government agencies and scientific organizations. A review of the activities of the AIBS during the past year was given. The Governing Board authorized the printing and distribution of a summary of AIBS progress during the year to some 20,000 biologists included in the AIBS addressograph files. *Bulletin* readers will receive copies of this progress report by mail later this month.

The holding of a **General Conference of Editors of Biological Journals** in the winter or early spring of 1957 was approved. The National Science Foundation is supporting this proposal and Fred R. Cagle of Tulane University has accepted appointment as Director. He is now preparing working papers for the approximately fifty editors who will participate in the Conference.

A Conference on Aging as a Biological Problem was authorized and support for this Conference is being sought from the National Science Foundation. The Conference probably will be held in the spring of 1957.*

By direction of the Board of Governors the AIBS will assume publication rights for the **Quarterly Review of Biology** effective January 1, 1957. Printing of this journal will continue to be contracted to the Waverly Press and the editorial staff will remain unchanged for one year. The Quarterly Review will be added to the activities of the AIBS Editorial Board and future appointments of editors will be the responsibility of the Editorial Board. Editors will be appointed for five year terms on a rotating schedule. The former publishers—Williams and Wilkins—had announced in the June issue of the Quarterly Review that the subscription rate would be increased from $6.00 to $7.50 per year. The Governing Board directed that the annual subscription rate be reduced to $6.50 for members of AIBS Member Societies and Individual Members of AIBS. The annual rate of $7.50 will apply to all others.

The entrance of the AIBS into the field of translation and publication of foreign periodicals was authorized. Financial support will be sought from the National Science Foundation for the translation, printing, and distribution of three **Russian Language Biological Periodicals** during the year 1957. These journals are Microbiology, Plant Physiology, and the Biological and Botanical Sections of the Proceedings of the Academy of Sciences of the USSR. By means of a subsidy from the support of the National Science Foundation these journals could be sold at a reasonable subscription rate and it is hoped that wide distribution of these periodicals to research centers could thus be assured.

The interest of biologists in the international dissemination of scientific research was further reflected in the appointment of an Ad Hoc **Committee on International Relations.** This Committee is charged with the study of the role that AIBS could play in furthering the exchange of scientific information between the United States and foreign nations.

The establishment of a **Group Life Insurance Plan** also was authorized. The Plan is directed at younger biologists who are members of AIBS Member Societies or who are Individual Members of the Institute. It provides maximum coverage including waiver of premium and double indemnity provisions at extremely low premium rates. Full information is given on page 44.

The Registration Fee for the AIBS sponsored annual meetings was reduced from $5.00 to $3.00 for bona fide graduate students.

Officers for 1957 were elected at the meeting. They are as follows:

President:	Wallace O. Fenn
Vice President:	Paul J. Kramer
Secretary-Treasurer:	Frank P. Cullinan
Member of Executive Committee:	Carl P. Swanson

* See note in *The AIBS Reports* column.

Budget for 1957 as approved by the Governing Board follows:

A. *INCOME*

Society Dues		$ 15,000.00
Affiliate Dues		1,400.00
Associate Contributions		3,800.00
Individual Members (Exclusive of Life Members)		700.00
Bulletin (Exclusive of Program Issue)		
Subscription and miscellaneous	$ 700.00	
Advertising	8,000.00	8,700.00
Business Services		2,100.00
Convention		
Registration fees	$ 9,000.00	
Exhibit Hall	6,000.00	
Program advertising	2,700.00	17,700.00
Contract Overhead		
ONR Advisory Committees	$ 8,800.00	
NSF Register	3,000.00	
NSF Advisory Committees	2,550.00	
NSF Lecturers' Bureau	3,080.00	17,430.00
Contract Services Committed		
ONR Advisory Committees	$35,200.00	
NSF Register	17,000.00	
NSF Advisory Committees	12,450.00	
NSF Lecturers' Bureau	15,040.00	79,690.00
Publications		
Symposium Series		3,750.00
Rent (Suite 511)		3,420.00
Placement Service		150.00
TOTAL INCOME		$153,840.00

B. *EXPENDITURES*

Salaries			
AIBS	$27,415.00		
ONR Advisory Committees	6,880.00		
NSF Register	9,950.00		
NSF Lecturers' Bureau	2,165.00	$46,410.00	
Justifiable Salary Increases			
AIBS	$ 576.00		
ONR Advisory Committees	144.00		
NSF Register	.....		
NSF Lecturers' Bureau	45.00	765.00	$ 47,175.00
Rent (Suites 511 and 515)			8,091.00
Telephone, Postage, Supplies			2,230.00
Business Services			1,350.00
Special Services			
Insurance	$ 550.00		
Social Security	640.00		
Retirement			
AIBS	832.20		
ONR	273.12		
NSF	150.00		
Auditor	300.00		
Attorney	150.00		$ 2,895.00
Scientific Manpower Commission (including travel expenses of members)			$ 650.00
Convention			
General expenses		$ 6,000.00	
Program Issue		5,200.00	$ 11,200.00
Bulletin			10,000.00
Travel (Officers, Board, Staff)			3,000.00
Contract Services Committed			
ONR Advisory Committees		$27,903.00	
NSF Register		7,150.000	
NSF Advisory Committees		12,450.00	
NSF Lecturers' Bureau		12,830.00	$ 60,333.00
Publications			
Symposium Series			3,200.00
Placement Service			310.00
Support of AIBS Standing Committees			2,000.00
Contingency			1,406.00
TOTAL EXPENDITURES			$153,840.00

Decalog for the Botany Professor

1. Thou shalt have no other goals before leading students to learn.
2. Thou shalt not take unto thy class any dried or pickled plants, or graven images thereof, when living specimens can be found.
3. Thou shalt not take the name "Great Scientist" unto thyself, nor be vain.
4. Remember the sabbatic leave, if any; take it regularly to keep thee wholesome.
5. Honor thy students and thy colleagues, and respect them as equals except only in thy special field.
6. Thou shalt not kill—the enthusiasm of thy students by over-burdening them with trivial busywork.
7. Thou shalt not commit adulteration of student grades, even for a pretty face or pressure from the parents or the Department of Athletics.
8. Thou shalt not steal—away from the laboratory classes, leaving them solely to student assistants.
9. Thou shalt not bear false information to thy students, nor bluff, nor improvise before them.
10. Thou shalt not covet the zoologist's space, nor his budget, nor the bright man students and the maid students he receiveth from the premedical and nursing programs, nor any other thing that is zoological.

EDWARD M. PALMQUIST

Across the Editor's Desk

• The long-felt need for a **National Library of Medicine,** properly housed and staffed, was realized with the signing of a bill by President Eisenhower, on August 3, 1956. The bill provides for the establishment of the Library in the U. S. Public Health Service, under the supervision of a 17-member Board. The Board will consist of seven ex officio members: the Surgeons General of the Public Health Service, the Army, Navy and Air Force, the Chief Medical Director of the Department of Medicine and Surgery of the Veterans Administration, the Assistant Director for Biological and Medical Sciences of the National Science Foundation, and the Librarian of Congress, and ten additional members appointed by the President with the consent of the Senate. The appointive members will serve four years.

The site of the building has not been settled but a large group favor its erection in Washington, D. C. The present Armed Forces Medical Library will form the nucleus of the new Library. Biologists should be familiar with this institution through its publication, *Current List of Medical Literature,* which lists over 100,000 articles annually. The collection of the Armed Forces Medical Library totals nearly 1 million volumes. At the present time this Library is inadequately housed and in constant danger of destruction by fire. The need for a consolidated, modern building with room for future expansion has been admitted for some time. The passage of the bill creating the unified National Medical Library should be welcomed by all scientists who make use of this valuable service.

• **The appointment of nine members to the National Science Board** was confirmed by the Senate in May. These members are: Lawrence M. Gould, Paul M. Gross, George D. Humphrey, Edward J. McShane, Frederick A. Middlebush, Samuel M. Nabrit, Julius A. Stratton, Edward L. Tatum, and Warren Weaver. Drs. Gould, Gross, Humphrey and Middlebush, charter members of the Board, were re-appointed. Except for Dr. Weaver, all will serve terms of six years, ending May 10, 1962.

• **Leonard A. Scheele,** after serving eight years as Surgeon General and 23 years in the Public Health Service, resigned recently to become President of Warner-Chilcott Laboratories. During his tenure as Surgeon General, four new Institutes (National Heart Institute, National Institute of Arthritis and Metabolic Diseases, National Institute of Dental Research, and the National Institute of Neurological Diseases and Blindness) were added to the research facilities of the National Institutes of Health, Bethesda, Maryland and the research grants program was extensivly broadened. **Leroy E. Burney,** former Assistant Surgeon General and Deputy Chief, Bureau of State Services, succeeds Dr. Scheele as Surgeon General.

• **Fourteen American scholars received National Science Foundation travel grants to attend the Eighth International Congress for the History of Science** and the Fourth General Assembly of the International Union for the History of Science, held at Florence and Milan, Italy, September 3-10, 1956. Recipients of the travel grants were: Giorgio D. de Santillana, Charles C. Gillispie, C. Doris Hellman, Thomas P. Hughes, Genevieve Miller, Charles D. O'Malley, Duane H. D. Roller, Edward Rosen, Richard H. Shryock, William D. Stahlman, G. Kasten Tallmadge, Ilza Veith, Leslie P. Williams, and Harry Woolf.

• **Twenty-one research centers have been selected to receive grants under the Ford Foundation's program for strengthening and extending research in mental health.** The grants, totaling $6,826,850 will support research in personality dynamics and development; biological, physiological and somatic problems; social and community aspects of mental health; children's disorders; and studies in therapy.

• **The amount and scope of scientific research and development supported by trade organizations and other cooperative groups is the subject of *Research by Cooperative Organizations,*** the report of a survey sponsored by the National Science Foundation and prepared by the Battelle Memorial Institute. In 1953, 543 cooperative groups, trade organizations, professional and technical societies, agricultural cooperatives and research-educational cooperatives, spent $21 million for research and development. 70% went for applied research and 30% for basic research, mainly in the chemical and engineering sciences. Of the cooperative groups studied, the professional and technical societies devoted the largest proportion of the funds to basic research. Copies of the study may be obtained, for 35 cents, from the Superintendent of Documents, Washington 25, D. C.

• **The National Vitamin Foundation has announced the award of twelve new grants,** for a total of $84,295 to American universities to augment an already extensive program of clinical and laboratory research in the fields of vitamins and nutrition.

• **Expansion of the National Science Foundation program for the translation into English of Russian research literature** has included a grant to *Biological Abstracts* for the translation and publication of abstracts from the Russian journal, *Referativnyi Zhurnal: Biologiia.* During the last half of 1956 some 1,200 abstracts covered in this journal will be translated by Consultants Bureau, Inc. of New York and reprinted in *Biological Abstracts.*

The American Institute of Physics and the National Science Foundation have already successfully collaborated on the publication of a bimonthly Russian physics journal. The American Mathematical Society publishes about 1,000 pages annually of Russian work in mathematics. American scientists returning from recent trips to Russia noted that the Russians maintain a highly efficient system for translating scientific papers in other languages into Russian. For the role of AIBS in Russian translations see item under Governing Board Report.

• **Frits W. Went,** in charge of the Earhart Plant Research Laboratory and professor of plant physiology at the California Institute of Technology, was recently elected a corresponding member of the French Academy of Sciences. There are 116 corresponding members throughout the world, and Dr. Went was elected for his work on environmental influences on plant growth, and on plant hormones.

• **The M. Haswell Pierce Building, the University of Delaware's Marine Laboratory at Lewes, was formally dedicated June 9, 1956.** The dedication coincided with the 325th anniversary of the founding of the historic town of Lewes. Among those present to dedicate the new station were the Governor of Delaware, the Mayor of Lewes, the President of the University of Delaware and M. Haswell Pierce, for whom the building was named.

• **Max C. Brewer** has been appointed director of the Arctic Research Laboratory at Point Barrow, Alaska. The Laboratory is operated by the University of Alaska under contract with the Office of Naval Research. The new director assumed his duties in September, when Ira L. Wiggins, past director, returned to Stanford University where he is professor of biology and director of the Natural History Museum. Mr. Brewer is a geophysicist who has conducted extensive studies on the temperatures and thermal properties of permafrost and seasonal frost.

• **U. S. Atomic Energy Commission research reports are now available in various categories as "packets."** Prices have been reduced because of this bulk packaging and handling. The categories available are: health, physics, biology and medicine (220 reports); chemistry (455 reports); engineering (105 reports); geology and minerology (144 reports); instruments (292 reports); metallurgy and ceramics (380 reports); physics (1190 reports); miscellaneous (55 reports). For further information, write: Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

• **New York University has received, from the Rockefeller Foundation, a grant of $70,000 to support a study of public attitudes toward science reporting.** The results of a pilot study done last year were reported in a recent issue of the *Bulletin*. The current project, an extension of the earlier study, will be jointly sponsored by the National Association of Science Writers and the University.

• **The Dow Chemical Company and the University of Michigan are jointly sponsoring a basic research project in insect taxonomy,** specifically monographs on the family Ichneumonidae. Of the approximate 7,500 species, only one-third have been named. Henry Townes, formerly associate professor of entomology at North Carolina State College, will direct the project. Robert R. Dreisbach, Dow consultant and taxonomist will be associated with the project. Specialists in this field in other institutions will be contacted for assistance and advise.

• **The new isotope farm of the Medical College of Virginia,** sponsored by the American Tobacco Company at a cost of $120,000, was opened recently by Willard F. Libby, Commissioner, U. S. Atomic Energy Commission.

• **The D. V. Nostrand Company, Princeton, N. J., will now distribute the works of the Elsevier Publishing Company** of Amsterdam, Netherlands, publisher of European scientific and technical books.

• ***Industrial Research Laboratories of the United States,* (1956) tenth edition, is now available** from the Office of Publications, National Research Council, 2101 Constitution Avenue, Washington 25, D. C. This publication is an annotated directory that has been published since 1920 and contains, in the new edition, information on 4834 laboratories of 4060 companies. The book sells for $10 and discounts will be given to all educational and other non-profit organizations, all local and state governments in the U. S., and to all units of the Federal Government.

• **The next International Cytological Congress,** under the auspices of the International Society of Cell Biology, will be held at St. Andrews, Scotland, August 28-September 3, 1957.

• **Longwood Gardens of the Longwood Foundation, Inc., has announced a grant to the Plant Introduction Section of the U. S. Department of Agriculture,** Beltsville, Maryland, to support the exploration and introduction of new or little known plants of potential value to ornamental horticulture in the United States. The introduction of agriculture germ plasm has long been the primary objective of foreign plant exploration of the U.S.D.A. The Longwood grant will now permit full-time search for ornamentals abroad. Under this cooperative agreement, the Department will undertake foreign exploration for ornamental plants in Japan, Yokushima, and the Ryukyu Islands during 1956-57.

• **The range and growth of scientific research activities by Federal departments and agencies is the subject of a newly released report, "*Organization of the Federal Government for Scientific Activiites.*"** Thirty-eight agencies of Government are engaged in the conduct of and support of basic, applied and developmental research, as well as scientific data collection in the physical, life, and social sciences. These activities range from missile tests to the search for a cancer cure, from collection of population census data to the study of radio astronomy. Copies of the report may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for $1.75.

• **The first in a series of grants in support of computation centers and research in numerical analysis has been announced by the National Science Foundation.** Grants totaling $135,000 have been awarded as follows: California Institute of Technology, $38,000; Massachusetts Institute of Technology, $30,000; Oregon State College, $20,000; University of Washington, $17,500; University of Wisconsin, $30,000. The funds will be used to establish the nucleus for a computing center where none exists, to extend existing centers, and to pay rental for computing time. In some instances part of the funds will be used for salaries of research assistants. Only a few large computing centers around the country are available for basic research problems and these generally on a part-time basis only. The Foundation hopes to strengthen basic research in a number of fields by providing access to computing facilities.

• **The former *British Abstracts of Medical Sciences* is now being published as the *International Abstracts of Biological Sciences,*** (Address: 4 & 5 Fitzroy Square, London, W. 1.) with broadened coverage of world literature in the biological sciences.

• **The Ninth General Conference of UNESCO will meet in New Delhi, India in November.** Seven delegates from the United States have been named by President Eisenhower: Stanley C. Allyn, Athelstan F. Spilhous, Mrs. Elizabeth B. Heffelfinger, Asa T. Spaulding, Mrs. Helen Crocker Russell; alternative delegates: Undersecretary of Health, Education and Welfare, Herold C. Hunt, and Ambassador to Cambodia, Robert McClintock.

• ***Handbook of Scientific and Technical Awards in the United States and Canada, 1900-1952,* a project of the science-Technology Division of the Special Libraries Association, has just been published.** It lists the criteria for selecting winners, type of award given and a chronological list of recipients for each award granted by selected American and Canadian scientific and technical societies. Cloth-bound, the *Handbook* may be purchased for $10.00 from the Special Libraries Association, 31 East 10th St., New York 3, N. Y.

• **Federally supported basic scientific research of an unclassified nature will be made more widely available to scientists under terms of a new program announced by the National Science Foundation.** The program, designated Government Research Information, is designed to assist any research scientist to: (1) Learn what unclassified scientific reports on Government research are being issued in his field of interest and how he can obtain them; (2) Obtain, on a subscription basis, a report-announcement service that automatically will keep him informed regarding the bulk of such reports in fundamental research and through which he can purchase copies of listed reports, and (3) Obtain access to a well-catalogued reference collection of unclassified scientific reports on federally supported basic research which he can consult as much as he now consults books in a reference library.

The first of the three services is offered by the Clearinghouse of the National Science Foundation's Office of Scientific Information. The staff of the Clearinghouse is experienced in all phases of this activity and all mail, telephone or personal requests should be submitted through Dwight E. Gray, Government Research Information Clearinghouse, National Science Foundation, Washington 25, D. C.

The automatic announcement service covering reports on Government supported scientific research is an expansion of an activity which the Office of Technical Services (OTS), Department of Commerce, has been offering for several years. The OTS publishes a subscription journal, *U. S. Government Research Reports,* an annotated, monthly listing of reports. Each entry includes information as how that document can be obtained. Present additional support will allow OTS to increase its program. Further information about this activity may be obtained from Offices of Technical Services, Department of Commerce, Washington 25, D. C., c/o John C. Green, Director.

The third service is being offered by the Library of Congress in its Science Division. Readers are free to consult the report catalogues and reference assistance will bring them copies of any reports. As in the case of the Library's book collections, reports cannot be taken out. In general however, any report in this open collection may be purchased either from OTS or in photoreproduced form from the Library. Complete information may be obtained from the Science Division, Library of Congress, Washington 25, D. C., attention John Sherrod, Acting Chief.

• **A revised booklet, "*Immunization Information for International Travel*" may be of interest to many biologists.** It has been prepared by the Public Health Service of the Department of Health, Education and Welfare and may be purchased (25¢ a copy) from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

• **Publication of Volume 1, Number 1 of a new periodical, *Physics in Medicine and Biology*, has been announced by Academic Press Inc.,** sole agents for the journal in the United States and Canada. It will be edited by J. E. Roberts, with Consulting Editor, N. F. Mott, F.R.S., and an editorial board consisting of: W. A. Langmead, D. A. McDonald, J. S. Mitchell, F.R.S., G. J. Neary, J. Rotblat, F. W. Spiers and J. F. Tait. The major policy of the Editorial Board will be "to facilitate the reporting of the results of original researches by physicists and others in the two main fields; (a) studies of the physical properties and constitution of living matter at all levels of organization and (b) applications of physics and methods of physics to the elucidation of problems in medicine, biology and physiology." Volume 1, priced at $9.80 is available from Academic Press Inc., 111 Fifth Ave., New York 3, N. Y.

• **The National Science Foundation has announced 289 grants totaling $3,504,227 awarded during the quarter ending June 30, 1956** for support of basic research in the sciences, for conferences in support of science, for exchange of scientific information, for training of science teachers, and for the support for attendance of scientists at scientific meetings abroad.

• **A grant of $450,000 from the Ford Foundation will support a new area of research at the California Institute of Technology.** Under the direction of Nobel Laureate Linus Pauling, a team of scientists will explore the molecular chemistry of mental disease. The basis of the program, as stated by Dr. Pauling, is "the probability that many cases of mental deficiency—perhaps most of them—are the result of gene-controlled molecular abnormalities." The program, for which the Ford grant ensures a five-year start, will be carried out largely in Caltech's newly constructed Norman W. Church Laboratory for Chemical Biology.

• **The Ford Foundation, on September 16, announced grants totaling $21,750,000 to strengthen instruction in the 44 privately-supported medical schools now in operation in the United States.** The grants are to be held by the recipient institutions as invested endowment for at least ten years. During this time the income from the endowment may be expended for instructional purposes. Excluded from the purposes of the grants are construction and research needs.

• ***Medical News*, the first newspaper for physicians, marked its first anniversary in September.** The eight-page tabloid is published every other week for Ciba Pharmaceutical Products Inc., by an independent board of editors. With a circulation of over 100,000 it brings in brief, up-to-the-minute form, news in such diverse fields as clinical medicine, medical education, basic research, public health, medical economics and legislation directly affecting physicians. The distribution of *Medical News* now includes 300 copies of each issue to the U. S. Information Agency for its libraries in more than 80 countries.

That a newspaper be published for biologists, in fact for all scientists, was proposed some time ago in *Science* by Ralph E. Cleland, a member of the AIBS Publications Committee. Although Dr. Cleland's concept of such a newspaper varied somewhat from the format and content of *Medical News*, the success of this venture would seem to indicate the use of the idea in another field.

One of the recent issues of *Medical News*, contained a report by Dr. Joe Hin Tjio, of the Estacion Experimental de Aula Dei in Zaragosa, Spain, given at the First International Human Genetics Congress held recently in Copenhagen, that man has 46 chromosomes, not 48 as always believed. Working at the Cancer Chromosome Laboratory (Institute of Genetics, Lund, Sweden) with Dr. Albert Levan, Institute Director, the new and correct count was found in tissue cultures of fibroblasts from embryonic human lung. Constant counts of 46 were also found in embryos obtained after therapeutic abortion. Two British cytologists, Drs. C. E. Ford and J. L. Hamerton of Harwell, at the same congress, confirmed the count.

• **The question of loyalty among scientists working on unclassified, federally-supported research grants not involving security considerations, has been receiving considerable attention and has finally become the subject of an administrative directive.** The American Association for the Advancement of Science, at its December 1954 Berkeley, California meeting, issued a policy statement on the matter. Shortly afterwards the President appointed a committee on Loyalty in Relation to Government Support of Unclassified Research, under the chairmanship of Detlev Bronk, President of the National Academy of Sciences—National Research Council. The Report of this Committee was submitted to the White House and circulated to the Executive Departments and to the Agencies which are primarily involved in the problem. In August, a statement was released indicating general satisfaction with the Report and pointing out the similarity to principles laid down by the National Science Foundation. That biologists will know exactly what this policy is, the statement issued by the National Science Foundation follows.

"The National Science Foundation, in appraising the merit of a proposal submitted by or on behalf of a scientist for the support of unclassified research not involving considerations of security, will not, on the basis of unsupported charges, pass judgment on the loyalty of an individual. In making a grant, it will be guided as to an individual's experience, competence, and integrity by the judgment of scientists having a working knowledge of his qualifications. However, the Foundation does not knowingly give nor continue a grant in support of research for one who is:

1. An avowed Communist or anyone established as being a Communist by a judicial proceeding, or by an unappealed determination by the Attorney General or the Subversive Activities Control Board pursuant to the Subversive Activities Control Act of 1950, or anyone who avowedly advocates change in the U. S. Government by other than constitutional means, or
2. An individual who has been convicted of sabotage, espionage, sedition, subversive activity under the Smith Act, or a similar crime involving the Nation's security.

Furthermore, if substantial information coming to the attention of the Foundation indicates that a potential or actual researcher might be guilty of violation of any such law, the information will be forwarded to the Department of Justice for its consideration."

• **Congress recently passed legislation authorizing the expenditure of $400,000 to enable the World Health Organization to hold its 11th World Assembly in the United States in 1958.** (See article in this issue by Maurice Visscher.)

• **Possibly the first United States patent for the control of an industrial process by genetic means was issued recently** to Donald F. Jones, Connecticut Agricultural Experiment Station, and Paul C. Mangelsdorf, Harvard University. The patent has been assigned to Research Corporation, a non-profit foundation that administers patents that originate in college or university research. The foundation uses royalties from the patents for research grants. In the patented process, the seed-producing line of corn has bred into it a cytoplasmic gene for male sterility— rendering the crop tassel-less and thereby eliminating or greatly reducing hand removal of tassels in the production of hybrid corn. If double-cross hybrid seed is desired, hand removal of tassels may be used at one stage, or a dominant gene for restoration of male fertility may be introduced into one of the stocks to be crossed to the product of the first male-sterile cross.

• **The Chesapeake Bay Institute of the Johns Hopkins University** will be removed this fall from St. Margaret's, Md. where work has been carried on for the past 7 years. The research projects will be moved to the University in Baltimore and to a small institution in Annapolis, Md.

• **Iowa State College and the U. S. Department of Agriculture have jointly selected a 318-acre tract of land east of Ames, Iowa as the site for a new Federal livestock and poultry disease laboratory.** The land is being purchased by the state of Iowa and transferred to the U.S.D.A. without charge. Funds totaling $16.25 million for construction of the laboratory were allocated in an appropriation bill signed by the President in July. U.S.D.A. Agricultural Research Service technicians will participate in planning the facility and will be responsible for its subsequent operation. Construction is expected to begin in the summer of 1957.

• **The U. S. Fish and Wildlife Service recently granted three research contracts for the study of problems in the shrimp, sponge and tuna industries.** The Marine Laboratory of the University of Miami will conduct two of the projects; one, under a $19.900 contract, for an investigation of the causes and prevention of "black spot" of shrimp; and the other, a $12,000 contract, for the investigation of Florida commercial sponges. The Scripps Institution of Oceanography, under a $35,000 contract, will investigate the tropical Pacific Ocean for the benefit of the tuna industry.

• **The Arctic Institute of North America** (see *AIBS Bulletin*, Vol. VI, No. 3) **has awarded 31 research grants in 15 areas of study for 1956.** Financial support is provided by the Office of Naval Research (U. S. Navy), the Sir Frederick Banting Fund administered by the National Research Council of Canada, and by industrial and individual contributors. These grants bring to more than 200 the field studies of the Arctic supported by this organization to date.

• **The U. S. Atomic Energy Commission has established two new programs to expand facilities for training in nuclear energy technology in colleges and universities.** It is hoped that this plan will result in a greater supply of nuclear engineers, scientists, and technicians.

Under the first of the new programs, grants will be made toward the cost of equipment used in course work on nuclear technology. No single institution may receive a grant in excess of $350.000.

Under the second new program, source and special nuclear material will be lent, without charge, for use, burn-up, fabrication. preparation of fuel solutions, or reprocessing material after use. By-product materials will be furnished at a cost of 20 percent list price. The value of any materials lent to any single institution may not exceed $50,000. Details of the new programs may be obtained from the Director, Division of Reactor Development, U. S. Atomic Energy Commission, Washington 25, D. C.

• **A grant of $105,000 from the Rockefeller Foundation, has been made to the Boyce Thompson Institute for Plant Research** (see *AIBS Bulletin*, Vol. VI, No. 3) for a 5-year period. The grant will be used to support the work of Lawrence P. Miller, Robert G. Owens, and S. E. A. McCallan on the mechanisms of fungicide action.

• **Operation of the well-known Yerkes Laboratories of Primate Biology at Orange Park, Florida, was transferred October 1, 1956, from Yale University to Emory University.** Research work is supported by the Ford, Rockefeller, and Carnegie Foundations, the National Science Foundation, Atomic Energy Commission, National Research Council, and the National Institute of Mental Health. Research will continue under the auspices of Emory, with the same primary emphasis on the behaviorial sciences of chimpanzees. An international reputation has been built by the Yerkes Laboratories for studies related to growth and development, sex, and comparative individual psychology, and long term scientific records are a feature of the station.

Henry Nisson, director of the Laboratories, will continue as director under the new sponsorship. The same Board of Scientific Directors will continue to serve: Leonard Carmichael (chairman), George W. Corner, C. N. H. Long, J. Lawrence Pool, William T. Taliaferro, Karl S. Lashley, Frederick L. Hisaw, and Henry Nissen, ex-officio member.

• **Irvin Stewart,** President of West Virginia University, headed the U. S. delegation to a symposium on the organization and administration of applied research, held in Vienna, Austria, October 8-12. Other members of the delegation included: Norman Shepard, Lawrence Bass, M. H. Trytten, Carlton S. Dargusch, C. E. Sunderlin, Harry Kelly and Allen V. Asten. The conference, under the auspices of the European Economic Cooperation (OEEC), considered recommendations for inter-European as well as individual country programs, the supply and recruiting of research workers, the staffing of applied research organizations, and related problems.

• **The Division of Biological and Medical Sciences of the National Science Foundation, announces that the next closing date for receipt of research proposals in the life sciences is January 15, 1957.** Proposals received prior to that date will be reviewed at the Winter meetings of the Foundation's advisory panels and disposition will be made approximately 3 months following the closing date. Proposals received after January 15, 1957 will be reviewed following the Spring closing date of May 15, 1957.

• **The American Association for the Advancement of Science dedicated its new headquarters building in Washington, D. C., October 12, 1956.** As part of the dedication ceremonies, a special program on "The Uses and Effects of Atomic Radiation" was held. The Chairman was Paul Sears, President of AAAS and speakers and subjects were: Radiation and the Human Body, Shields Warren; Radiation and Genetics, L. C. Dunn; The Uses of Atomic Radiation and Energy, L. R. Hafstad; Social Implications of Atomic Radiation and Energy, Detlev W. Bronk; Current Research Findings, Willard F. Libby; What We Most Need to Know, Laurence H. Snyder. The dedication ceremonies and open house took place at 1515 Massachusetts Avenue.

• **The Scientists' Committee on Security was formed in January of 1956** "to (1) act as a clearinghouse for information and responsible scientific opinion on matters of information security and personnel security; (2) To undertake, from time to time, special studies of particular, important issues of science and security and to prepare and make public appropriate reports; (3) To cooperate with and to assist Government agencies in establishing and maintaining realistic security programs which safeguard both the long-range security of the United States and the traditional rights of its citizens; (4) To stimulate constructive thought on questions of information security and personnel security; (5) To foster a better popular understanding of the true relationship of science and security."

Present members of the Committee are: Ernest C. Pollard, chairman, Ralph S. Brown, Jr., John B. Phelps, Hans G. Graetzer, Earle C. Fowler, Robert L. Gluckstern, Samuel A. Goudsmit, William A. Higinbotham, Franklin Hutchinson, G. Evelyn Hutchinson, William J. Knox, Henry L. Kraybill, Lester Lewis, Theodore K. Osgood, George F. Pieper, Waldo Rall, Julien M. Sturtevant, Hugh C. Wolfe. Further information may be obtained by writing to: Scientists' Committee for Security, 2153 Yale Station, New Haven, Conn.

• **Ciba Pharmaceutical Products awarded a total of $140,000 during the first six months of 1956** to research workers and institutions throughout the United States for clinical and laboratory investigations. These awards bring to $1,885,000 the total amount of research grants awarded by Ciba since 1950.

• **The Smith College Genetics Experiment Station was discontinued at the end of 1955, a year after the death of Dr. Albert F. Blakeslee, its founder and director since 1942.** Investigations at the station have resulted in the announcement of many new facts and principles derived from new chromosomal varieties of *Datura* with duplicated chromosomes or chromosome sections. However, there are many unfinished research problems and opportunities for investigations with *Datura* in genetics, cytogenetics, plant physiology and morphology. The ten herbaceous species of *Datura* provide an excellent opportunity to study many

angles of the species problem: hybridization, compatible and incompatible crosses, the barriers to crossability. Tetraploid, as well as diploid lines of most species, as well as chromosomally different races are available. In *Datura stramonium* there are available many $2n + 1$ types, nearly a hundred different chromosomal races (Prime types), as well as many gene types. Some races have been maintained by selfing for more than forty generations.

The National Science Foundation recently made a grant to Smith College to finance the assembling of data on *Datura* genetics and related problems, and its publication in monograph form. This work will be in charge of A. G. Avery; the principal contributors will be Sophie Satin and J. Rietsema.

Datura is almost an ideal plant for research. It is easy to grow either in the greenhouse or field; selfing and crossing is simple and a large number of seed is produced. As many as four generations a year have been obtained in special instances although two or three are usual. It is also readily propagated by cuttings or grafting.

Seeds of all the species and most of the races and types have been grown and placed in controlled cold storage. These are available to any investigator who desires to continue some phase of the *Datura* research. Application should be made to Dr. H. H. Plough, Amherst College, Amherst, Mass., indicating the seeds desired and the general nature of the investigation planned. Seeds will be mailed promptly.

• **The VII International Congress of Microbiology will be held in Stockholm, Sweden in August 1958.** Professor Sven Gard, Karolinska Institutet, will be President of the Congress and Dr. Goran Helden, the Secretary General.

• **The Board of Trustees of the Biological Stain Commission has found it necessary to increase the price of Certification Labels** by 5 cents, effective September 1, 1956. This will result in a change from the current charge of 15 cents to a new charge of 20 cents per bottle to the purchasers of Certified Stains. This price increase was necessitated by increasing costs in the operation of the Commission, and is the first such in twenty years.

• **The University of Louisville has announced the creation of an endowed professorship of conservation,** made possible by a gift of $235,000 from anonymous donors. This chair, in the Biology Department, will be named in honor of Tom Wallace, editor emeritus of *The Louisville Times* and a national figure in the conservation movement of the country. Mr. Wallace served as president of the Izaak Walton League, as a member of the advisory board of the National Parks Service, and as chairman of the National Conference on State Parks. An appointment to this new position will be made in the near future.

• **"*Results of 1955 Fungicide Tests*", reprinted from a series of articles appearing in *Agricultural Chemicals*, April through June, 1956, may be purchased in bound and covered form** for $1.00 a copy by sending orders with remittance to Dr. A. G. Newhall, Department of Plant Pathology, College of Agriculture, Cornell University, Ithaca, N. Y. The publication of these results is under the sponsorship of the American Phytopathological Society. The Temporary Advisory Committee on Collecting and Disseminating Data on New Fungicide Tests of the Society arranged for this publication and the continuation of a program for annual publications of *Fungicide Test Results* in the future. Dr. Newhall will be in charge of this project during the current year.

• **The U. S. Atomic Energy Commission has announced the award of 20 unclassified life science research contracts in the fields of medicine and biology.** The contracts were awarded to universities and private institutions. Four of the awards are for new projects and one of these is in biology. Sixteen contract renewals, likewise for a one year period, will allow continuation of research already in progress. Of the latter group, eight awards are in biology.

• **Some 50 scientists, interested in various aspects of the field of biophysics, have organized a national conference to take place in Columbus, Ohio, March 4-6, 1957.** The program of the conference will include invited papers and a large number of contributed papers. Studies which employ the approach of physics to biological measurement and theory at levels of organization from molecules and cells to complex systems and psychophysics will be considered. Scientists wishing to contribute a paper at this Conference, or desiring further information, should contact Dr. Herman P. Schwan, School of Medicine, University of Pennsylvania, Philadelphia 4, Pa.

• **The National Science Foundation will make available a limited number of individual travel grants to partially defray the travel costs of American scientists to the following international congresses:**

Second International Congress of Photobiology, Turin, Italy, June 1-9, 1957. (Closing date for receipt of applications—January 1, 1957.)

Fourth Congress of the International Association of Gerontology, Merano, Italy, July 14-19, 1957. (Closing date for receipt of applications—January 1, 1957.)

First International Congress of Neurological Sciences, Brussels, Belgium, July 21-28, 1957. (Closing date for receipt of applications—January 1, 1957.)

Fifteenth International Congress of Psychology, Brussels, Belgium, July 28-August 3, 1957. (Closing date for receipt of applications—February 1, 1957.)

Fourth International Congress on Nutrition, Paris, France, July 24-29, 1957. (Closing date for receipt of applications—January 1, 1957.)

The Congress of the International Union for the Scientific Study of Population, Stockholm, Sweden, August 8-15, 1957. (Closing date for receipt of applications—March 1, 1957.)

Sixth Congress of the International Society for the Study of Biological Rhythms, Semmering, Austria, August 26-28, 1957. (Closing date for receipt of applications—January 1, 1957.)

Ninth International Congress of Cell Biology, St. Andrews, Scotland, August 28-September 2, 1957. (Closing date for receipt of applications—January 1, 1957.)

Application blanks may be obtained from the National Science Foundation, Washington 25, D. C. The deadline for receipt of completed applications is indicated above with respect to each of the congresses.

The screening of applications will generally be made by an appropriate *Ad Hoc* Advisory Committee. For example, in the case of the Cell Biology Congress, arrangements have been made with the American Institute of Biological Sciences to establish a committee of representatives from scientific societies concerned with Cell Biology. Such committees will evaluate applications and will generally decide the basis for recommending grantees to the Foundation.

• **Louis Levin,** program director for Regulatory Biology at the National Science Foundation since 1951 has been appointed Deputy Assistant Director of the Biological and Medical Sciences Division. Dr. Levin will retain his position as program director as well.

• **Frederick L. Hisaw,** Harvard zoologist, received the 1956 Medal of the Endocrine Society "for work of special distinction." Dr. Hisaw, an embryologist, physiologist and endocrinologist, has long worked on the physiology of reproduction in mammals, including humans. He was the discoverer, in 1926, of the female sex hormone, relaxin.

• **Truman Fossum,** agricultural economist with the U. S. Department of Agriculture since 1952, has been appointed assistant account executive on the Florists' Telegraph Delivery Association account in the New York offices of Grant Advertising.

• **John C. Moore** has been reappointed Research Fellow for 1956 at the American Museum of Natural History, New York. Prior to working at the Museum, Dr. Moore was park biologist at Everglades National Park for six years.

• **Marshall W. Jennison,** professor of bacteriology, has been appointed chairman of the Department of Plant Sciences at Syracuse University.

• **Claude E. ZoBell** has been appointed chairman of the newly organized Division of Marine Biology at the University of California's Scripps Institution of Oceanography at La Jolla. The new Division consolidates the former divisions of Marine Biochemistry, Botany, Genetics, Invertebrates, Microbiology and Marine Vertebrates and Special Developments. The total staff of the division is about 70.

• **F. Herbert Bormann** of the Department of Biology at Emory University resigned to accept an appointment as Assistant Professor of Botany at Dartmouth College, effective September 1956.

• **James R. Redmond** has joined the Biology Department of the University of Florida as Assistant Professor. **Herndon G. Dowling,** of the same department, has received a Post-doctoral Fellowship from the Graduate School for the academic year 1956-57. **Archie F. Carr,** also of the Department of Biology, has been granted an 18 month leave of absence to establish a department of biology at the University of Costa Rico.

• **H. B. Tukey,** head of the Depratment of Horticulture of Michigan State University, recently received the Norman J. Colman award of the American Association of Nurserymen.

• **Warren P. Stoutamire** has been appointed Assistant Botanist at the Cranbrook Institute of Science, Bloomfield Hills, Michigan.

• **Joseph C. Bequaert** and **Ludlow Griscom** have retired from the faculty of Harvard University. Dr. Bequaert, a medical entomologist, has been Curator of Insects and Agassiz Professor of Zoology at the Museum of Comparative Zoology since 1945. Mr. Griscom, Research Ornithologist in the Museum of Comparative Zoology, is known for his check-lists of American birds.

• **Samuel J. Golub,** for the past eight years assistant professor of botany at Brandeis University has been appointed senior research associate at the Fabric Research Laboratories, Dedham, Mass.

• **Wardell B. Pomeroy** and **Paul H. Gebhard** have been named codirectors of the Institute of Sex Research, Indiana University. They succeed Alfred C. Kinsey, founder of the Institute, who died in August.

• **McKeen Cattell,** chairman of the Department of Pharmacology at Cornell University Medical College, has been appointed to a newly created position of administrator of grants for the American Cancer Society.

• **R. E. Hungate,** professor of Bacteriology at the State College of Washington has resigned to accept a position in the Department of Bacteriology at the University of California, Davis.

• **Gotthold Steiner,** plant nematologist, and head of the U. S. Department of Agriculture work on nematodes for the last 24 years, retired in April of this year. He was succeeded by **Albert L. Taylor,** of the horticultural crops research branch of the Agricultural Research Service, USDA.

• **Caryl P. Haskins,** President of the Carnegie Institution of Washington, has been appointed, by the President, to the Board of Regents of the Smithsonian Institution.

• **Frank A. Brown, Jr.,** professor of biological sciences at Northwestern University, has resigned as chairman of the Department of Biological Sciences to devote more time to research. The department will be administered by: Ray Watterson (Chairman), Orlando Park and Hanford Tiffany.

• **John G. Seeley,** professor of floriculture at Pennsylvania State University, has been appointed professor of floriculture and head of the Department of Floriculture and Ornamental Horticulture at Cornell University. He succeeds **L. H. MacDaniels,** who retired June 30 after serving as head of the department for 16 years.

• **Robert S. Bray** has been named Chief of the Technical Information Division of the Library of Congress. Mr. Bray has served as Deputy Chief since 1950. This division performs specialized reference services in technical and scientific literature, under contract to the Department of Defense.

• **Marion S. Offutt** has been appointed associate professor of agronomy at the University of Arkansas in the College of Agriculture and Home Economics.

• **Edward H. Smith,** director of the Woods Hole Oceanographic Institution since 1950, retired in August. He will be succeeded by **Columbus O. Iselin,** professor of oceanography at Harvard University and chief oceanographer at the Woods Hole Oceanographic Institution.

• **Clarence C. Little,** president and director of the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine, plans to retire this fall. He will retain his position as scientific director of the Tobacco Industry Research Committee and chairman of its scientific advisory board. Dr. Little also intends to spend considerable time helping stabilize the financial conditions of the Jackson Laboratory, which has no endowment. **Earl L. Green,** of the Department of Zoology at Ohio State University will succeed Dr. Little as director of the Laboratory.

• **Willard H. Whitcomb,** who has been with private and government concerns in South America for the past ten years, has been appointed professor of entomology at the University of Arkansas College of Agriculture.

• **John J. Davis,** Purdue University, retired as head of the entomology department and the Purdue University Agricultural Experiment Station after 35 years of service. **John V. Osmum** succeeds Dr. Davis as head of the department.

• **Riley D. Housewright** has been appointed scientific director of the Army Chemical Corps Biological Warfare Laboratories at Fort Detrick, Md. He was formerly head of the Medical Bacteriology Division. He succeeds **John L. Schwab,** who has been named deputy for scientific activities of the Army Chemical Corps Research and Development Command.

• **Robert C. Cook** and **Warren O. Newson** were recent recipients of $500 Lasker Awards of the Planned Parenthood Federation of America. Dr. Nelson is currently on leave of absence from the Department of Anatomy at the State University of Iowa to serve as medical director of the Population Council. Dr. Cook, author of *The Modern Dilemma* and *Human Fertility,* directs the Population Reference Bureau in Washington, D. C. and has been editor of the *Journal of Heredity* for the past 35 years.

• **Detlev W. Bronk,** president of the National Academy of Sciences and of the Rockefeller Institute for Medical Research, recently received an honorary degree from Cambridge University, England.

• **Roger J. Williams,** director of the Biochemical Institute at the University of Texas received an honorary degree from Oregon State College.

• **Carl B. Koford,** Museum of Vertebrate Zoology, University of California, has been appointed resident naturalist of the Smithsonian Institution's Canal Zone Biological Area on Barro Colorado Island. He succeeds James Zetek, who retired recently after 45 years of service in the Canal Zone.

• **Vladimir Walters,** research associate in the department of fishes, has been named assistant curator of fishes at the American Museum of Natural History, New York.

• **Milton Levy** has been appointed chairman of the department of biochemistry at New York University; at the same institution, **Chester W. Hampel** was named chairman of the department of physiology and biophysics.

• **Leo E. Melchers,** Kansas State College, retired in July from the department of botany and plant pathology, after 43 years of service as teacher, administrator and research scientist.

• **Ross G. Harrison,** Sterling Professor of Biology Emeritus at Yale University, was the recent recipient of the Antonio Feltrinelli International prize of the Academia Nazionale dei Lincei of Italy. The prize, worth about $8000 in American currency, is awarded in the fields of science, the arts, music and literature. Dr. Harrison received the prize for his research in embryology, tissue culture and grafting.

• **Basile J. Luyet,** professor of biology at St. Louis University, was honored by the department recently on the 25th anniversary of his appointment to the faculty.

• **Recent deaths among biologists:**

Howard E. Pulling, Kennebunk, Maine; plant physiologist, professor of botany, Wellesley College. April 1956; 70.

Thomas H. McHatton, Athens, Georgia; professor emeritus and former head of the department of horticulture, University of Georgia; May 1956; 72.

Charles Thom, Port Jefferson, N. Y.; principal mycologist, USDA; May 1956; 83.

James M. Olmsted, Berkeley, California; professor emeritus of physiology, University of California, medical historian, May 1956; 70.

Martha M. Kennerly, Tucson, Ariz.; retired assistant professor of biology, Hunter College; May 1956; 83.

Edward M. Gilbert, San Marcos, Texas; professor emeritus of botany, University of Wisconsin. April 1956; 80.

Austin R. Middleton, Louisville, Ky.; professor of biology and founder of department of biology, University of Louisville. April 1956; 76.

George A. Dean, Manhattan, Kansas; professor emeritus of entomology, Kansas State College. April 1956; 66.

Gunnar Dahlberg, Uppsala, Sweden; professor of genetics and director emeritus of the State Institute of Human Genetics, University of Uppsala. July 1956; 63.

Ulrich A. Hauber, Davenport, Iowa; professor and head of the department of biology, St. Ambrose College. July 1956; 71.

Fred R. Jones, Madison, Wisconsin; former plant pathologist, USDA and research associate, University of Wisconsin. April 1956; 71.

Glenn Briggs, Washington, D. C.; research agriculturist, USDA, former professor, Oklahoma A & M College. August 1956; 65.

Samuel Brody, Columbia, Mo.; professor of dairy science, University of Missouri. August 1956; 66.

Joseph A. Trent, Shawnee, Okla.; professor of biology and chairman of department, Oklahoma Baptist University. July 1956; 56.

George H. Hogeboom, Bethesda, Md.; cellular biology section, National Cancer Institute, National Institutes of Health. July 1956; 43.

Ivar T. Tidestrom, St. Petersburg, Fla.; retired botanist, Catholic University and U. S. Department of Agriculture. August 1956; 91.

Stanley C. Ball, New Haven, Conn.; Curator emeritus of zoology, Peabody Museum, Yale University, ornithologist. August 1956; 70.

Wightman E. Garner, Washington, D. C.; plant physiologist, tobacco specialist. March 1956; 80.

Edmond L. Schmidt, Storrs, Conn.; histologist and physiologist, University of Connecticut. August 1956; 36.

Elmer G. Campbell, Orlando, Fla.; professor emeritus of biology, University of Georgia. June 1956; 80.

Lewis R. Cary, Princeton, N. J.; assistant professor emeritus, department of biology, Princeton University. July 1956; 75.

Anton J. Carlson, Chicago, Ill.; professor emeritus of physiology and former head of department, University of Chicago. September 1956; 81.

John W. Scott, Laramie, Wyo.; emeritus professor of zoology and former chairman of department, University of Wyoming. August 1956; 85.

Roy E. Clausen, Berkeley, California; professor and chairman, department of genetics, University of California. August 1956; 65.

Alfred C. Kinsey, Bloomington, Ind.; professor of zoology and director of the Institute for Sex Research, Indiana University. August 1956; 62.

George M. Reed, Pittsburgh, Pa.; curator emeritus, Brooklyn Botanic Garden. June 1956; 78.

From the Societies

• **The Society of American Foresters** held its 56th annual meeting in Memphis, Tenn., October 14-17, 1956. The general theme of the meeting was "Forestry Faces Forward." Four awards were made by President DeWitt Nelson, to the following recipients: **Samuel T. Dana,** dean emeritus of the School of Natural Resources, University of Michigan, received the Sir William Schlich Memorial Medal; **Inman F. Eldredge** of New Orleans, received the Gifford Pinchot Medal; **Leo A. Isaac** of the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, and **Philip C. Wakely** of the Southern Forest Experiment Station, New Orleans, each received a plaque and cash payment as awards "for outstanding achievement in biological research leading to the advancement of forestry."

• Recently elected officers of the **Mycological Society of America** for 1957 are: President: D. P. Rogers; President-elect: J. R. Raper; Vice-President: C. J. Alexopoulos; Secretary-Treasurer: E. S. Beneke, Michigan State University, East Lansing, Michigan.

The first dinner of the Mycological Society was held at the University of Connecticut during the AIBS meetings, to celebrate the 25th Anniversary of the founding of the Society. During the dinner, D. P. Rogers reviewed the historical development of the society; H. L. Barnett paid tribute to the pioneers; and G. W. Martin discussed future trends in the field of mycology.

Friends and students of Dr. ("Capt") W. H. Weston attended a special banquet at the Connecticut meetings, honoring his new status as Professor Emeritus of Harvard University. Dr. Weston intends to continue his research and teaching activities in mycology.

• The officers of the **Ecological Society of America** for 1957 are: President: W. A. Dreyer; President-elect: Stanley A. Cain; Vice-President: W. T. Penfound; Treasurer: A. C. Hodson; Secretary: John F. Reed, University of New Hampshire, Durham, New Hampshire. The Executive Committee for 1956-57 includes: W. A. Dreyer, W. T. Penfound, A. C. Hodson, H. J. Oosting, and J. F. Reed.

During the annual dinner of the Society at the University of Connecticut, the George Mercer Award for 1956 was presented to **Howard T. Odum** and **Eugene P. Odum** for their paper, published in *Ecological Monographs* 25: 291-320 (1955), entitled "Trophic Structure and Productivity of a Windward Coral Reef Community on Eniwetok Atoll." This award includes one hundred dollars and a plaque and is provided by an anonymous donor in memory of Lt. George Mercer, a young British naturalist who was killed in World War I.

George B. Rigg, Department of Botany at the University of Washington, Seattle, received the Eminent Ecologist's citation at the annual dinner of the Ecological Society. This citation is the Society's way of recognizing outstanding ecologists.

The Ecological Society of America will meet with the AIBS in 1957 at Stanford University, August 25-29th.

• **The Botanical Society of America** is celebrating its 50th Anniversary this year. As part of the celebration, fifty special Golden Jubilee awards were presented during the Anniversary dinner at the University of Connecticut to the following outstanding botanists: **Harry A. Allard,** Arlington, Va.; **Edgar Anderson,** Missouri Botanical Garden; **D. L. Bailey,** University of Toronto; **I. W. Bailey,** Harvard University; **H. H. Bartlett,** University of Michigan; **George W. Beadle,** California Institute of Technology; **Ernst A. Bessey,** Michigan State University; **S. F. Blake,** U. S. Department of Agriculture; **Emma L. Braun,** University of Cincinnati; **Stanley A. Cain,** University of Michigan; **Ralph W. Chaney,** University of California; **Agnes Chase,** Smithsonian Institution; **Jens C. Clausen,** Carnegie Institution of Washington; **Ralph E. Cleland,** Indiana University; **H. S. Conard,** Grinnell College; **William S. Cooper,** University of Minnesota; **John N. Couch,** University of North Carolina; **B. O. Dodge,** New York Botanical Garden; **Benjamin M. Duggar,** Lederle Laboratories; **A. J. Eames,** Cornell University; **Katherine Esau,** University of California; **A. W. Evans,** Yale University; **H. A. Gleason,** New York Botanical Garden; **T. H. Kearney,** California Academy of Sciences; **George W. Keitt,** University of Wisconsin; **Paul J. Kramer,** Duke University; **L. O. Kunkel,** Rockefeller Institute; **D. T. MacDougal,** Carnegie Institution of Washington; **George W. Martin,** State University of Iowa; **Maximino Martinex,** Instituto de Biologia, Mexico; **F. W. Popenoe,** Escuela Agricola Panamericana, Honduras; **W. J. Robbins,** New York Botanical Garden; **A. D. Rogers, III,** Columbus, Ohio; **Jacques Rousseau,** Montreal Botanical Garden; **Karl Sax,** Harvard University; **Paul B. Sears,** Yale University; **H. L. Shantz,** U. S. Forest Service; **Edmund W. Sinnott,** Yale University; **Folke K. Skoog,** University of Wisconsin; **Gilbert M. Smith,** Stanford University; **Elvin C. Stakman,** University of Minnesota; **George L. Stebbins,** University of California; **John A. Stevenson,** U. S. Department of Agriculture; **K. V. Thimann,** Harvard University; **Edgar N. Transeau,** Ohio State University; **C. B. van Niel,** Stanford University; **John E. Weaver,** University of Nebraska; **Frits W. Went,** California Institute of Technology; **Ralph H. Wetmore,** Harvard University; **Truman G. Yunker,** DePauw University.

A special Golden Jubilee Volume of articles and essays in botany will be published shortly by the McGraw-Hill Book Company as another feature of the Anniversary celebrations. Some of the articles in this volume have appeared during 1956 in *The American Journal of Botany.*

The Botanical Society of America elected the following officers for 1957: President: George S. Avery; Vice-President: Paul Weatherwax; Treasurer: Harry J. Fuller; Secretary Harold C. Bold, Department of Biology, Vanderbilt University, Nashville, Tennessee.

The Darbaker Award, this year a check for two hundred dollars, for meritorious research in the field of microscopic algae, was awarded to **Robert W. Krauss,** Associate Professor of Botany, University of Maryland.

• **The American Physiological Society is offering a William Townsend Porter Fellowship for 1957.** Candidates must have completed at least one year of graduate training, to have demonstrated capacity for research, and to have outlined a program of meritorious study. The Fellowship may be taken at an institution of choice, in physiology, with 40 percent of a Fellow's time allowed for teaching. The Fellowship offers a stipend of $3000 and is available for either July or September 1957. It will be awarded April 1, 1957 but applications must be in the hands of: Executive Secretary, American Physiological Society, 9650 Wisconsin Ave., Washington 14, D. C., by *January 10, 1957.*

Ray G. Daggs has resigned as director of Research at the Army Medical Research Laboratory, Fort Knox, Kentucky, to accept the position of Executive Secretary-Treasurer of the American Physiological Society. **Milton O. Lee,** former Executive Secretary, will continue as Managing Editor and as Secretary of the Federation of American Societies for Experimental Biology.

• **The Phycological Society of America** elected the following 1956-57 officers, during its August meeting at Storrs: President: G. F. Papenfuss; Vice-President: L. A. Whitford; Treasurer: R. C. Starr; Secretary: P. C. Silva, Dept. of Botany, Indiana University, Bloomington, Indiana.

• Officers of the **American Society of Plant Physiologists** for 1957 are: President: Folke K. Skoog; Vice-President: Sterling B. Hendricks; Secretary: Arthur W. Galston; Executive Secretary-Treasurer: G. Ray Noggle, Charles F. Kettering Foundation, Yellow Springs, Ohio.

J. Fisher Stanfield has resigned from the position of Executive Secretary-Treasurer of A.S.P.P. for reasons of ill health.

Effective January 1, 1958 **Allan H. Brown,** University of Minnesota, will become the new Editor of *Plant Physiology,* official journal of the Society.

The two annual awards of the American Society of Plant Physiologists were made during the Storrs meetings. The Charles Reid Barnes Life Membership Award made to **H. B. Vickery** of the Connecticut Agricultural Experiment Station. The Stephen Hales Award was received by **Melvin Calvin** of the University of California, for his charting of the path of carbon in photosynthesis.

Extra copies of the Supplement of Vol. 31 of *Plant Physiology,* containing abstracts of papers presented at the Storrs meeting, are available from the Secretary, A. W. Galston, Yale University, New Haven, Connecticut, for $.50.

• **The Society of General Physiologists,** which met during the AIBS meetings at Storrs, elected the following officers for 1957: President: Daniel Mazia; Vice-President: Folke K. Skoog; Treasurer: Irvin M. Klotz; Secretary: Abraham M. Shanes, National Institutes of Health, Bethesda 14, Maryland. Councillors for 1957-58 are: Britton Chance and John T. Bonner.

• The 1957 meetings of the **American Association of Anatomists** will be held at the University of Maryland, Baltimore, April 17-19th.

• **The Poultry Science Association** will hold its annual 1957 meeting at the University of Missouri, Columbia, Mo., August 6-9; and the 1958 meeting at Cornell University, Ithaca, N. Y., August 12-15.

During the recent summer meeting of the Association, the following awards were made: the ADMA Award went to **S. J. Slinger,** Ontario Agricultural College, Guelph, Canada; the Borden Award for 1956 to **Paul D. Sturkie,** Rutgers University, New Brunswick; the Poultry Science Research Award to **Hans Fisher,** Rutgers University; the Poultry Science Extension Award to **H. H. Kauffman,** Pennsylvania State University; Poultry Science Teaching Award to **Lewis Taylor,** University of Cali-

fornia, Berkeley. **W. E. Newlon,** University of California and **H. J. Stafseth,** Michigan State University were made Fellows in the Association.

Officers of the Association for 1957 are: President: T. B. Avery; First Vice-President: H. R. Bird; Second Vice-President: J. H. Brunckner; Secretary-Treasurer: C. B. Ryan, Texas A & M College. College Station, Texas; Editor: H. D. Branion, Ontario Agricultural College, Guelph, Canada. Directors for 1956-57: O. E. Goff, A. B. Watts, and G. E. Bearse. Directors for 1957-58: C. S. Shaffner and J. H. Quisenberry.

• **The American Phytopathological Society** will meet December 6-8. 1956 at the Netherland-Hilton Hotel, Cincinnati, with the Potato Association of America.

• **The American Society of Human Genetics** elected the following officers for 1957: President: Curt Stern; President-elect: William C. Boyd; Vice-President: Philip Levine; Treasurer: Walter E. Heston; Secretary: Eldon J. Gardner, Department of Zoology. Utah State Agricultural College, Logan, Utah. Directors of the Society are: Gorden Allen, J. B. Birdsell, William J. Schull, J. Lawrence Angel, Raymond B. Cattell, and Herluf H. Strandskov.

• Officers of the **American Society of Parasitologists** for 1957 are: President: Gilbert F. Otto; President-elect: A. C. Walton: Vice-President: Allen McIntosh; Treasurer: Robert M. Stabler; Secretary: Paul E. Thompson, Park-Davis & Co., 1 McDougall at River. Detroit 32, Michigan.

• **The Society of Protozoologists** elected the following officers for 1957: President: Alfred M. Elliott; Vice-Presidents: Harold W. Beams and William D. Burbanck; Treasurer: William F. Diller; Secretary: Norman D. Levine, College of Veterinary Medicine, University of Illinois, Urbana, Illinois; Executive Committee Member: John O. Corliss.

• **Robert F. Thorne,** State University of Iowa, and **Robert L. Wilbur,** North Carolina State College, shared the George R. Cooley Award of $500 of the **American Society of Plant Taxonomists.** This award is given for outstanding papers published during the preceding year on the flora of southeastern United States. Dr. Thorn's paper, "The Vascular Plants of Southwestern Georgia." appeared in *The American Midland Naturalist* and Dr. Wilbur's paper, published in *Rhodora,* was entitled "A Revision of the North American Genus *Sabatia* (Gentianaceae)."

The George R. Cooley Award of $100, for the outstanding paper presented before the Society at its annual meeting, held this year at Storrs in conjunction with AIBS, went to **Henry J. Thompson,** of the University of California at Los Angeles, for a paper entitled "A Genetic Approach to the Taxonomy of *Mentzelia lindleyi.*"

• **The National Pest Control Association** has announced the following regional pest control conferences to be held in cooperation with (1) University of Massachusetts, January 23-25, 1957, (2) Purdue University, January 28-February 1, 1957, (3) Louisiana State University, January 28-30, 1957.

• **The Pacific Section of the American Society of Limnology and Oceanography** elected the following officers: President: George L. Pickard; Vice-President: Marston C. Sargent; Secretary-Treasurer: Maurice Rattray, Jr., University of Washington, Seattle, Washington.

• **The American Society of Mammologists** elected the following 1957 officers: President: William B. Davis; Vice-Presidents: Robert T. Orr and Stephen D. Durrant; Treasurer: Caroline A. Heppenstall; Recording Secretary: Randolph L. Peterson; Corresponding Secretary: Bryan P. Glass, Oklahoma A & M College, Stillwater, Oklahoma.

• **The Society of American Bacteriologists** will hold its annual meetings in the following places: 1957—Detroit; 1958—Purdue University; 1959—St. Louis; 1960—Philadelphia; and 1961—Chicago.

• **The National Association for Research in Science Teaching** elected the following officers for 1957: President: Waldo W. E. Blanchet; Vice-President: Nathan S. Washton; Secretary-Treasurer: Clarence M. Pruitt, University of Tampa, Florida.

• 1957 officers of the **American Society of Ichthyologists and Herpetologists** are: President: Edward H. Taylor; Vice-Presidents: John C. Marr, L. P. Woods, and A. P. Blair; Treasurer: Coleman J. Goin; Secretary: Arnold B. Grobman, Florida State Museum, Gainesville, Florida.

• 1956-57 officers of the **Western Section of the Ecological Society of America** are: Past Chairman: Curtis L. Newcombe; Chairman: Cornelius H. Muller; Vice-Chairman: Herbert Mason; Secretary: W. T. Edmondson, Dept. of Zoology, University of Washington, Seattle, Washington.

• **The 8th Annual Midwestern Conference of Parasitologists** was held at the State University of Iowa June 11-12, 1956. The Conference was dedicated to the memory of C. A. Herrick, in recognition of outstanding work in parasitology and his major role in the affairs of the Conference. The program consisted of 22 research demonstrations and a series of selected motion pictures on parasitology. Dinner speaker was William Headlee, University of Indiana Medical Center, who discussed his work on the epidemiology of the parasitic helminths in Thailand. J. E. Ackert was elected presiding officer of the 1957 Conference which will probably be held at one of the mid-western summer biological stations.

• The 1956-57 officers of the **Association of Southeastern Biologists,** elected during their spring meeting at Duke University, are: President: George Kent; President-elect: H. K. Wallace; Vice-President: Paul M. Patterson; Treasurer: A. W. Jones; Secretary: J. C. Dickinson, Biology Dept., University of Florida; Members of the Executive Committee: W. S. Flory and I. C. Kitchen.

The Association awarded **H. L. Blomquist** the meritorious award provided by the Will Corporation of Georgia for outstanding contributions to the biological sciences through teaching young people; **E. Ruffin Jones** received the research fellowship of $150, at the Mountain Lake Biological Station, provided by Phipps and Bird of Richmond; the research prize of $100, provided by the Carolina Biological Supply Company of Elon College, went to **A. A. Humpheries, Jr.,** for his paper "A Study of Meiosis in Coelomic and Oviductual Oocytes of *Triturus viridesence,* with Particular Emphasis on the Origin of Spontaneous Polyploidy and Effects of Heat Shock on the First Meiotic Division."

• **The 22nd North American Wildlife Conference** will be held March 4-6, 1957 at the Statler Hotel, Washington, D. C. All persons having papers that merit consideration for presentation during the technical sessions of this international conference should send them to one of the appropriate chairmen (below) before the deadline of November 15, 1956. Chairmen are: Disease, Nutrition and Controls: O. Wilford Olsen, Colorado Agricultural College, Ft. Collins; Wetlands and Inland Water Resources: Frank C. Bellrose, Jr., Illinois Natural History Survey, Urbana; Upland Game Resources: Wendell G. Swank, Arizona Game and Fish Dept., Phoenix; Marine and Coastal Resources: Clarence P. Idyll, Marine Laboratory, University of Miami, Coral Gables, Fla.; Big Game Resources: Harold S. Crane, Utah Fish and Game Commission, Salt Lake City; Conservation Education: John D. Bulger, National Wildlife Federation, Route 2, Groton, N. Y.

The A.I.B.S. Reports

• **Twenty-three biological societies met under the auspices of AIBS from August 26th through 30th at the University of Connecticut at Storrs.** With 2900 biologists registered (3400 in attendance) this Seventh Annual Meeting of Biological Societies was second in size only to the Cornell meeting of 1952. Almost 1400 research and symposium papers were presented. Byron T. Shaw, Administrator of the Agricultural Research Service spoke on "Biology Unlimited" at the Monday evening General Meeting.

The Botanical Society of America celebrated its Golden Jubilee with several symposia surveying the achievements in various fields of botany during the past half-century. At the Golden Jubilee Dinner, which was attended by more people than any banquet in the Society's history, 50 Golden Jubilee Awards for Meritorious Achievement in the Field of Botany were presented. The Mycological Society of America celebrated its 25th Anniversary at this year's meetings. One of the highlights was the Society's 25th Anniversary Dinner held on Monday evening. To round out the anniversary theme these AIBS meetings inaugurated the year-long celebration of the 75th anniversary of The University of Connecticut.

The Biology Science Exhibit—always an interesting feature of the meetings—was composed of 50 booths. This was the largest exhibit hall yet sponsored by the AIBS and is perhaps another evidence of the increasing importance of the Annual Meetings.

• **John A. Behnke,** Chairman of the AIBS Publications Committee has resigned as associate administrative secretary of the AAAS to accept a position as vice-president and science editor of the Ronald Press Company, New York.

• **The AIBS Biology Advisory Committee to the Office of Naval Research** will accept research proposals until November 23, 1956. The meeting of the Committee for the evaluation of the proposals will be held early in 1957.

• During the recent convention at the University of Connecticut the **AIBS Placement Service** registered 188 biologists and arranged interviews for 67 prospective employers. For the first time, the positions listed with the Service are being arranged into a List of Available Positions, which will be distributed to all current registrants.

The December printed list of registrants is now being assembled. The deadline for applications is November 16, 1956. Any member of a Member Society or an individual member of AIBS may register for $2.00; a member of an Affiliate Society for $5.00; and all others, $10.00. Registration covers the publication of one *curriculum vitae*. Employers interested in obtaining this list of registrants may do so for $1.00 by writing to: AIBS Placement Service, 2000 P St., N.W., Washington 6, D. C.

• **The Office of Naval Research celebrated its 10th Anniversary in August 1956.** Created by Congress in 1946 "to plan, foster, and encourage scientific research related to the maintenance of future naval power and preservation of national security," the ONR has carried out a well-knit program of basic as well as applied research. Four-fifths of all its financed research has been conducted outside Government laboratories and facilities—largely through grants to universities, commercial and industrial laboratories and nonprofit scientific institutions for specific, though often generously interpreted, research projects. The AIBS, for several years now, has maintained Advisory Committees to ONR for the evaluation of research proposals submitted in various areas of the biological sciences. The breadth of ONR's program and the continued realization of the importance of basic research, has made the Office a leader among Federal scientific agencies. The AIBS is proud to have been associated with the Biological Sciences Division of ONR for this period of time.

• **A series of visits by outstanding biologists to small liberal arts colleges and universities is being arranged by the AIBS Speakers Bureau.** Requests for speakers have been received from 50 institutions and 28 prominent biologists have agreed to participate in the program. These scientists will spend from three to five days on campus and during that time will be available for classroom lectures seminars, science club meetings and informal sessions with biology majors. They will also be available to other colleges and high schools in the area. It is felt that this program, which is supported by a grant from the National Science Foundation, will be extremely effective in stimulating the better science majors at these schools to choose biology as a career. Applications for assignment of speakers should be addressed to: Speakers Bureau, American Institute of Biological Sciences, 2000 P St., N.W., Washington, D. C.

Speakers who will participate during the coming winter and spring are: Daniel I. Arnon, E. J. Boell, John T. Bonner, Victor R. Boswell, Frank A. Brown, Jr., Dietrich Bodenstein, Theodore H. Bullock, Barry Commoner, Harry J. Fuller, Arthur W. Galston, Ralph Gerard, C. Nash Herndon, Daniel Mazia, George L. McNew, William D. McElroy, Robert C. Murphy, Howard T. Odum, Loren C. Petry, Ernest Pollard, S. R. M. Reynolds, Kenneth D. Roeder, Karl Sax, Karl P. Schmidt, Edmund W. Sinnott, Laurence H. Snyder, Kenneth V. Thimann, Talbot H. Waterman, and Paul Weatherwax.

• **The Botanical Society of America has been given a grant by the National Science Foundation in support of a Committee to study "The Role of Botany in American Education."** The Committee will meet probably during the winter or early spring of 1957 for three to four days. About fifteen botanists chosen from all major fields of the science will make up the Committee. At least three problems to be considered by the Committee are: 1. Decreasing enrollment in botany courses. 2. The trend toward offering biology instead of botany and zoology courses for college freshmen. 3. The botanical content of biological courses. The Botanical Society authorized the AIBS to act as its agent in negotiations leading to the awarding of the grant. The AIBS will receive and disburse the funds, make all arrangements for the meeting of the Committee and for the dissemination of the Committee's Report.

This is an example of a service AIBS can perform for its constituent member societies and a service that we are called upon more and more frequently to do. In each case the proposed activity is under the policy control of the society. The role of AIBS is that of an agent for the society.

• **A grant has been received by the AIBS from the National Science Foundation to support a General Conference of Biological Editors.** A detailed report on plans for this conference will appear in the January issue of the BULLETIN.

• **The National Science Foundation has awarded the AIBS a grant to support a conference to be held in the spring of 1957 on "Aging as a Biological Problem."** This proposal originated from a recommendation of the AIBS Committee for Basic Biological Research on Aging.

In the spring of 1955, at about the same time that the AIBS became independent of the National Research Council, a group of biologists approached the AIBS with a proposal that a committee on the broad basic aspects of the general biological problem of aging be established. At its April 1955 meeting the Governing Board authorized establishment of such a Committee and the Committee held its first meeting at Brandeis University in June 1955. The Committee, was therefore, an outgrowth of the spontaneous interest of a number of biologists in the development of a national program of biological, biochemical, physiological and genetic work on the problem of the aging process in living things. This approach obviously is quite different from that of the groups now working so effectively in the fields of gerontology and geriatrics. At the June 1955 meeting, the Committee recommended that a conference be held to discuss the problems of biological aging in areas in which

work presently is being done, as well as other areas which offer promise for experimental work. The Executive Committee and the Governing Board unanimously endorsed the proposed conference and funds have now been obtained from the National Science Foundation. The Conference tentatively is scheduled for two full days and some fifty specialists will be invited to participate. The general theme of the conference may be summarized in the following three points: 1. Why do living things die? 2. Why do they die when they do? 3. How can these questions be attacked experimentally?

Biological Education

• **The Institute of International Education, New York, has announced the establishment of a Central Index of Educational Exchangees.** All foreign visitors who have come to the United States to study and Americans who have gone abroad during the last 36 years, are listed. More than 210,000 persons are included and it is expected that information on 25,000-30,000 new exchangees will be added annually. The Index was made possible through the financial assistance of the Ford Foundation. A 21-page booket, *Population Involved in International Education*, has been published to describe the content of the Index and suggest possible uses. The Index should prove valuable in research, program planning and personnel recruitment.

• **Stanford University School of Medicine has announced the establishment of a new department of biochemistry,** effective September 1, 1956. The new department will be located on the Palo Alto campus and will be headed by Edward L. Tatum, former professor of biological sciences.

• **The Ciba Foundation has announced its 1957 awards program for papers on problems of aging.** Five awards (or more), of an average value of 300 pounds sterling, are available. Entries will be judged by an international panel composed of: C. H. Best (Toronto), E. Braun-Menendex (Buenos Aires), E. J. Conway (Dublin), G. W. Corner (New York), A. Haddow (London), V. R. Khanolkar (Bombay), R. Nicolaysen (Oslo), A. S. Parkes (London), F. Verzar (Basle), and F. G. Young (Cambridge).

The work submitted should not have been published before May 31, 1956, although it may be accepted for publication at that date. A paper should be in the candidate's own language; should not exceed 7000 words in length; and a summary in English not exceeding 3% of the total length must be attached. There may be co-authors but the award will be given to the senior author (to share as he sees fit). Preference will be given to younger workers. Copies of the regulations and application forms must be obtained and submitted with the entry. All entries must be received before January 31, 1957 by the Director of the Foundation, G. E. W. Wolstenholme, Ciba Foundation, 41 Portland Place, London, W1, England.

• **The largest veterans' training program in the world virtually came to an end in July of this year.** The 12 year old World War II GI Bill gave 7,800,000 veterans a chance to pursue their education and make up for the years occupied by military service. Under another program, the vocational rehabilitation training program for disabled veterans of World War II, more than 610,000 men received training that would assist them in becoming self-reliant. The Korean GI Bill, entering its fourth year, will have 750,000 veterans enrolled in schools and training establishments this fall.

The Veteran's Administration has issued some interesting figures on the training received by veterans under these programs. Of the more than 7,800,000 who received training under the W.W.II GI Bill, 2,200,000 attended college; 3,500,000 went to schools below the college level; 1,400,000 took on-the-job training and 700,000 enrolled in institutional on-farm training. Out of every 100 GI-trained veterans, 33 aimed for highly-skilled trade and industrial jobs; 10 engaged in scientific studies, including engineering and medicine; another 10 went into management and business administration; another 10 learned the latest techniques of scientific farming; 6 studied the humanities, 5 took sales and clerical courses; 3 prepared to be teachers and the remainder trained for a wide variety of occupations. The GI Bill training program has cost $14.5 billion to date.

• **Scientists from Harvard University and Massachusetts Institute of Technology are cooperating in the presentation of a filmed series of 23 television programs aimed at giving a better understanding of science and scientists.** The films are being prepared for national distribution to educational TV stations. Each program will focus on a single idea essential to an understanding of modern scientific thinking. The presentation will include experimental demonstrations and graphic illustrations. The series has been organized under the leadership of Philippe LeCorbeiller, Professor of General Education and Applied Physics, Harvard University. He will be joined in the programs by: Gerald Holton, Leonard K. Nash, I. Bernard Cohen, Sanborn C. Brown, Bart J. Bok, Harlow Shapley and Kirtley F. Mather. The series will be produced by the Lowell Institute Cooperative Broadcasting Council, Boston, under contract with the Educational Television and Radio Center, Ann Arbor, Michigan.

• **The Council for Basic Education, a newly formed national organization, has been created to deal with fundamental problems of education.** This group will seek more effective training for teachers and students in basic subjects, especially English, Mathematics, Science, History and Foreign Languages. Starting with a nationwide membership of 110 prominent laymen, educators, editors, writers, and industrialists, the Council will expand to include individual membership as soon as headquarters have been established. It will also enlist the support and cooperation of educational, professional and citizens' organizations that are concerned with these problems. The activities of the Council are being financed by a generous grant from one of the private foundations. Arthur Bestor, professor of history at the University of Illinois was elected President; Judge Paxton Blair, a former New York Supreme Court Justice, was named Vice-president, and Howard A. Meyerhoff, Executive Director of the Scientific Manpower Commission, was named Treasurer. The directors appoin'ed Harold L. Clapp, professor of Romance languages at Grinnell College, to the post of Executive Secretary of the Council for one year. Dr. Clapp is now on leave of absence from Grinnell to set up Council headquarters (208 Union Trust Building, Washington 5, D. C.) and activate the program.

• **The Argonne National Laboratory accepted for employment during the summer of 1956, 76 faculty members and 41 students,** representing 63 different educational institutions. The Laboratory, which is operated for the U. S. Atomic Energy Commission by the University of Chicago, makes such appointments each summer to encourage research and strengthen teaching in fields related to atomic energy.

• **St. John's University, Brooklyn, N. Y., has begun construction on a new Science-Pharmacy Hall** at its Long Island Campus at Hillcrest, Jamaica. The cost of the building (with partial equipment) will be $4 million. It will accommodate 1,200 students at one time in classrooms and laboratories, and should be ready for occupancy by the fall of 1958.

• **The American Association of University Women has announced 30 national fellowships for women in 1957-58.** A number of international fellowships, ranging from $1500 to $2000, are also available for pre- and post-doctoral research. National Fellowships carry stipends from $2000-$4000. All Fellowships require completion of residence requirements for the doctorate, but are unrestricted as to field and place of study. Application, which must be made by *December 15, 1956*, should be made to: Miss Mary H. Smith, AAUW Fellowships Program, 1634 Eye St., N.W., Washington, D. C.

• ***Baccalaureate Origins of Science Doctorates Awarded in the United States, 1936-50,*** compiled by the Office of Scientific Personnel under the direction of M. H. Trytten, is now available from the National Research Council (2101 Constitution Ave., Washington 25, D. C.) for $2.00. This publication identifies all doctorate degrees granted in the natural sciences by institution and field of specialization in tabular and graphic form.

• **Research opportunities in a number of fields bearing on the use of southern farm crops are being offered at the Southern Research Branch, New Orleans, of the Agricultural Research Service, U. S. Department of Agriculture.** The positions are graded under Federal Civil Service. Openings range from $8,990 for experienced scientists to $3,175 for scientific aides. Chemists specializing in organic, physical, or analytical chemistry or biochemistry are needed; cotton technologists, chemical and textile engineers, and mechanical engineers to help develop cotton processing machinery are also required. Further information may be obtained from: C. H. Fisher, Chief, Southern Utilization Research Branch, 1100 Robert E. Lee Blvd., New Orleans 19, La. Application should be made through the U. S. Civil Service Commission, 8th Civil Service Region, 1114 Commerce St., Dallas, Texas.

• **A professorship and a research fund in the Cornell University Laboratory of Ornithology have been established by the R. T. French Company** of Rochester, N. Y., manufacturers of bird foods and bird-care products. **William C. Dilger,** assistant professor of biology at St. Lawrence University, is the first staff member appointed under the grant. Dr. Dilger will serve as assistant director in charge of research projects in the Ornithology Laboratory, and will also be an assistant professor in Cornell's Department of Conservation. The R. T. French Company is contributing $12,000 a year to support the chair and research. The research supported will be especially concerned with studies of behavior, genetics and nutrition of both wild and caged birds.

• **The U. S. Navy has established a plan whereby high school graduates, who wish to study in science or engineering, may combine work at Naval installations with study at colleges.** The Navy will provide partial scholarships for the study phase, as well as government salaries during both the work and study periods. In return students will agree to continue after graduation as Naval civilian employees for a minimum of one year for each year of training received. For further information, write to: Office of Industrial Relations, Navy Department, Washington 25, D. C.

• **This September the Chicago City Junior College initiated free college-credit courses by television, open to the public.** The four credit courses, general biology, freshman English, social science and national government, are being offered over WTTW. Each course is presented in 45 half-hour sessions, 3 days a week. Kinescope film of the programs is shown to evening viewers one week later. Registration for credit is open to high school graduates and any adult 21 years of age or older. Legal residents of Chicago pay only the usual college general service charge. Students outside the city limits may enroll for credit, but they must pay the usual non-resident tuition in addition to the service charge. Examinations will be held on the college campus for credit students. A free information folder, containing the course outlies, is available to anyone upon request.

• **National Education Week will be November 11-17th.** Sponsored by the National Education Association, the American Legion, the National Congress of Parents and Teachers, and the U. S. Office of Education, emphasis will be placed on a wider public understanding of, and support for, education at elementary and secondary levels.

• **The Department of Health, Education and Welfare has announced that more than 500 U. S. and foreign teachers will participate in the 1956-57 exchange program of the U. S. Office of Education.** One hundred American teachers departed in August for Great Britain and 100 teachers from the United Kingdom arrived at the same time to teach for one year in this country. Another 55 U. S. teachers will interchange with an equal number of teachers from Australia, Austria, Belgium, Canada, France, Germany, Italy, the Netherlands, New Zealand and Norway. An additional 103 American teachers left in September for other countries to teach on one-way assignments. During the summer period, 71 U. S. teachers attended summer seminars in France, Germany and Italy.

• **The Ford Foundation has announced a grant of $3.5 million to the Institute of International Education.** The grant will be allocated in equal installments during the next 10 years in support of the Institute's work in its field, and especially in support of the international exchange of persons. A 10-year grant of $1.5 million has also been received by the Institute from the Carnegie Foundation and a 5-year grant of $250,000 from the Rockefeller Foundation.

• **One million dollars will be spent by the Manufacturing Chemists Association during the next 5 years on a program designed to attract more young people into careers in science and engineering.** This year printed brochures and visual aids will be provided students and teachers in 3600 junior high schools. Later the program will be expanded to include 11,700 high schools that offer chemistry courses and should reach 400,000 students.

• **The U. S. Civil Service Commission has announced examinations for Public Health Biologist, Medical Entomologist, and Chemist, and for Medical Microbiologists** in the fields of bacteriology, immuno-serology, mycology, parasitology and virology. The positions are in the Communicable Disease Center of the Public Health Service in Atlanta, Georgia, and at other locations where the Center's activities are conducted. The salaries range from $5,440 to $11,610 a year. To qualify, applicants must have had appropriate education or experience or a combination of both. The announcements contain full information regarding the requirements and how to apply. Applications will be accepted by the Board of U. S. Civil Service Examiners, Communicable Disease Center, 50 Seventh St., N.W., Atlanta 23, Georgia, until further notice.

• **One out of every five graduate students and one out of every six undergraduates in all fields of study received support in some form from the Federal Government during 1954.** This information is contained in a report entilted, *Federal Support for Science Students in Higher Education,* which was released recently by the National Science Foundation. The percentage of Government-supported students studying the sciences was found to increase with the educational level. While only one-fourth (82,000) of the undergraduate group were studying in the sciences, approximately half (18,000) of the graduate students, and virtually all (1,300) of those receiving assistance for post-doctoral training and research, were pursuing scientific studies. Eligibility for Federal support at the undergraduate level was determined almost exclusively by military service. More than one out of every three students receiving Federal aid for graduate study was employed as a research assistant on research grants or contracts awarded by Federal agencies to senior investigators at colleges and universities. Veteran's educational benefits provided support to more than a quarter of all federally aided graduate students. In addition, about 1,600 graduate students received fellowships from such agencies as Atomic Energy Commission. National Science Foundation, National Institutes of Health and the Department of State. Copies of this report may be obtained from the Superinendent of Documents, Washington 25, D. C., for 30 cents.

• **A Senior Research Fellowship program administered by the National Institutes of Health, is now in operation.** During the first year, this program will provide for a total of 40-50 awards to the Nation's medical schools, dental schools, and schools

of public health. These awards will be increased by a like number each year for five years until a total of 200-250 such fellowships are awarded annually. The awards will be for a maximum of $10,000 a year and may be retained for as long as five years. Only three applications may be made per year by each school. The program is designed to attract and hold able investigators in the preclinical sciences. Requests for information concerning this program should be addressed to: Chief, Research Fellowship Program, Division of Research Grants, National Institutes of Health, Bethesda 14, Md.

• **The first Summer Institute of Botany, arranged by the Botanical Society of America with the support of the National Science Foundation, was completed in August at Cornell University.** Fifty-one persons, selected from among 110 applicants, attended and received stipends to cover living costs during the conference. Another 14 botanists asked to attend at their own expense. Participants came from 29 states, the District of Columbia and three provinces of Canada. The Institute, under the direction of Harlan Banks, had the following objectives: to improve the subject matter competence of botany teachers, to strengthen the capacity of these teachers to motivate students to consider careers in botany, to bring these teachers into personal contact with the highly productive scientists who formed the staff of the Institute, and to stimulate some teachers to initiate, or to continue, small research programs in their home institutions. The Society hopes to be able to continue this program with another Summer Institute in 1957.

• **Applications for the seventh Sigma Delta Epsilon Fellowship Award will be accepted until February 1, 1957.** Women with the equivalent of a Ph.D. degree, carrying on research in the mathematical, physical, or biological sciences, who need financial assistance and give evidence of high ability and promise, are eligible. During the term of her appointment the appointee must devote the major part of her time to the approved research project, and not engage in other work for remuneration (unless such work shall have received the written approval of the Fellowships Award Board before the award of the fellowship). The stipend is $1600. Application blanks may be obtained from: Dr. Dorothy Quiggle, Petroleum Refining Laboratory, Pennsylvania State University, University Park, Pa. Announcement of the award will be made early in March 1957.

• **Application forms for grants in support of research and of personnel for research of the American Cancer Society will be available early in November 1956.** Applications received by January 1, 1957 will be acted on during the late winter and early spring. Grants recommended will normally become effective July 1, 1957, unless some other arrangement is requested and approved. Investigators now receiving support will hear directly from the Society concerning application for renewal grants. Scientists interested in applying for new grants are invited to write to: The American Cancer Society, Inc., 521 West 57th St., New York 19, N. Y.

In the future, application deadlines will be January 1, May 1, and September 1. Grants recommended will become effective six months after the application deadline. Types of grants available will include Project Grants, Program Grants, Institutional Research Grants, Contracts for Research, Post-doctoral Fellowships, Grants for Scholars in Cancer Research, and Grants for Additional Faculty-level Positions. The Society expects to distribute at least $7 million during 1957.

• **The McGraw-Hill Book Company has announced its intention to publish a multi-volume compendium of today's scientific and technological knowledge called, "The McGraw-Hill Encyclopedia of Science and Technology."** It will be made up of several thousand alphabetically arranged and cross-indexed articles, written by acknowledged authorities in science and engineering. It will be prepared at the college underclassman level, will total some 7,000 oversize pages, probably bound in ten volumes, and will be well illustrated. It is expected to be completed in about three years. Editorial offices for the project are being established at Charlottesville, Virginia, where the nearby University of Virginia can be utilized for research.

• **Nominations for the 1957 Eli Lilly Research Award in Bacteriology and Immunology** should be sent to Dr. Alan W. Bernheimer, New York University College of Medicine, New York 16, N. Y., not later than January 15, 1957. No reprints or manuscripts should be offered. Four copies of all material should be submitted and must include the following: (1) Month, day and year of birth, (2) Curriculum, (3) List of publication, (4) Specific references to the research upon which the nomination is based, (5) Supporting letters, if possible. To be eligible for the Award, the nominee shall be less than 35 years of age on April 30, 1957, and shall have performed outstanding research in bacteriology or its related fields. "Outstanding research" is taken to mean that which is of unusual merit in the younger age group, and is not to be compared with work of more mature and experienced workers. Neither the nominee or nominator need be a member of the Society of American Bacteriologists.

• **Regents of the University of California have voted to expand over a period of years, the faculty and facilities of the La Jolla campus** and to provide a graduate program emphasizing science and technology. The La Jolla campus is the site of the Scripps Institution of Oceanography, which has been part of the University since 1912. The reputation of the University of California and the climatic advantages of San Diego make it likely that a faculty of the highest caliber can be recruited for the expanding campus.

• **The summer institute and academic year institute program of the National Science Foundation has been considerably increased for 1957.** A quotation from the appropriation bill (H. R. 9739) for the institutes, reads "provided: that of the foregoing amount not less than $9,500,000 shall be available for tuition, grants, and allowances in connection with a program of supplementary training for high school science and mathematics teachers." This larger-than-ever amount will be approximately equally divided between summer institutes, of which some 85 will be supported, and academic year institutes, to the number of 16 or so. A large number of applications and proposals have been received by NSF for these institutes. Announcements will be made about grants for the academic institutes early in December while the summer institute awards will be announced at the beginning of January.

The Biology Library

One copy of each publication submitted for listing should be sent to the Editor, AIBS Bulletin, 2000 P Street, N.W., Washington 6, D. C. Only books published within a year of receipt will be reviewed. Books marked with an ★ are those published by Bulletin advertisers.

ANIMAL SCIENCES

★**Aquatic Insects of California.** With Keys to North American Genera and California Species. Edited by ROBERT L. USINGER. 508 pgs., illus. University of California Press, Berkeley 4, Calif. (1956) $10.00

The contributors and editor of this large volume are to be congratulated for assembling so much material that has been scattered previously in research journals. Since the aquatic environment attracts many diverse types of biologists, a fact-gathering, synthesizing publication is especially welcome. The Editor writes in the preface, "It is the purpose of this study to point out the central role of insects in aquatic situations, to bring to bear on insects the

basic concepts and tools of limnology, and to provide keys and illustrations to aid in the identification of aquatic insects." Contributors of special chapters or sections include: W. C. Bentinck, H. G. Chandler, W. C. Day, D. G. Denning, K. S. Hagen, S. G. Jewett, Jr., W. H. Lange, Jr., I. La Rivers, J. D. Lattin, H. B. Leech, A. E. Pritchard, D. B. Scott, Jr., R. F. Smith, Alan Stone, R. L. Usinger, and W. W. Wirth. Illustrations, line drawings and photographs are plentiful.

Mammals of Northern Alaska. JAMES W. BEE and E. RAYMOND HALL. 309 pgs., illus. University of Kansas Museum of Natural History (Publication No. 8), Lawrence, Kansas. (1956) $1.00 paper bound; $4.00 cloth bound.

The Arctic Slope of Alaska, source of the mammals described in this book, is defined as the region from the crest of the Brooks Range of mountains northward to the Arctic Ocean. In this region 7 orders, 18 families, 32 genera and 42 species of mammals are found. These species are treated in a most comprehensive manner by the two authors. Historical detail and natural history discussions lend interest to an otherwise typical systematic manual. Illustrations include skull diagrams and range maps.

Handbook of Mammals of Kansas. E. RAYMOND HALL. 303 pgs., illus. University of Kansas Museum of Natural History and State Biological Survey (Publication No. 7), Lawrence, Kansas. (1955) $1.50 paper bound; $4.00 cloth bound.

The Museum of Natural History at the University of Kansas is performing an excellent service to scientists and laymen alike in publishing exceptionally attractive handbooks of the native fauna of the State. In this volume, the native mammals are described with more-than-adequate illustration. The term "native mammal" is used to denote one that occurs in the State without having been brought there by man, or a kind that occurred in the State when White Man first came to North America.

Handbook of Amphibians & Reptiles of Kansas. HOBART M. SMITH. 356 pgs., illus. University of Kansas Museum of Natural History and State Biological Survey (Publication No. 9), Lawrence, Kansas. (2nd edition, 1956) $1.50 paper bound; $4.00 cloth bound.

This handbook was designed "to meet the needs of students and others who have little or no biological background but who are interested, either casually or seriously, in the identification, habits and distribution of the amphibians and reptiles of the State of Kansas." Professional herpetologists will find nothing new except perhaps some range maps. The subject matter is handled in an interesting manner and the many and diverse illustrations do much for the appearance as well as the usefulness of the volume.

★Animal Nutrition. LEONARD A. MAYNARD and JOHN K. LOOSLI. 484 pgs., illus. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N. Y. (4th edition, 1956) $7.50

This new edition of one of the most popular listings in the McGraw-Hill Publications in the Agricultural Sciences, maintains the general framework and character of the earlier editions with the addition of extensive new material. A new chapter, Antibiotics, Hormones and Other Growth-stimulating Substances, presents the "epoch-making nutritional developments which have occurred in these areas during the past five years." Recent information on the functions, metabolism and requirements of amino acids, vitamins and mineral elements brings these sections of the book up to date. The senior author, an international figure in the field, is Director of the School of Nutrition at Cornell University; Dr. Loosli is Professor of Animal Nutrition at the same University.

★Human Anatomy and Physiology. NELLIE D. MILLARD, BARRY G. KING, and MARY JANE SHOWERS. 593 pgs., 315 figs. W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa. (4th edition, 1956) $5.00

Human Anatomy and Physiology is essentially a text for professional courses in nursing schools although it might be used in undergraduate courses in colleges and universities. The fourth edition was prepared with the reviews and constructive criticism of earlier editions in mind—largely, rearrangement of chapter sequence and the addition of newer data. The original organization of material into five functional units have been maintained: 1. The Body as a Integrated Whole, 2. Integration and Control of the Body by the Nervous System, 3. The Erect and Moving Body, 4. Maintaining the Metabolism of the Body, and 5. Reproduction of the Human Being.

The American Arbacia and Other Sea Urchins. ETHEL BROWNE HARVEY. 298 pgs., illus. Princeton University Press, Princeton, N. J. (1956) $6.00

No person in this country is better qualified to write a monograph on American Arbacia than Dr. Ethel Browne Harvey. The common occurrence of sea urchins on the Eastern coast of North America, the ease of obtaining them, and the large quantities of eggs produced during the summer, make Arbacia one of the better experimental animals for cellular study from every line of approach—cytological, embryological, physiological and biochemical. Beginning with the early work of Jacques Loeb and T. H. Morgan at Woods Hole in 1892-1893, numerous workers and hundreds of papers have been involved with this line of research. This book brings together, historically and scientifically, all of the important data on the cells and physiological processes of the sea urchin.

A Manual of Parasitic Mites. E. W. BAKER, T. M. EVANS, D. J. GOULD, W. B. HULL, and H. L. KEEGAN. 170 pgs., illus. National Pest Control Association, Inc., 30 Church St., New York 7, N. Y. (1956)

The National Pest Control Association has performed a great service to its members and to entomologists everywhere who are concerned with mites of economic importance by publishing this manual prepared by authorities in this specialized and relatively little known area. To an entomologist who is unaccustomed to any animal having more than six legs this is a strange and wonderful book. It contains beautiful line drawings of 57 species of mites, and one is fascinated by the intricate morphology of these animacules. Each species is given an introductory paragraph on its economic significance, a technical description that would aid in its identification, an account of its life history, methods for its control, and references to the literature on it. To anyone who is itching for information on economic mites this book should be invaluable. *F. L. Campbell.*

Fishing with Natural Insects. ALVAH PETERSON. 176 pgs., illus. Alvah Peterson, Entomology Division, Ohio State University, Columbus 10, Ohio (1956) $6.00

An Angler's Guide to Useful and Interesting Information about Common Insects and a Few Imitation Lures that Fishermen Use for Bait—such is the longer title given by the author to his pioneering effort to make entomology understandable and useful to sport fishermen. Professor Peterson, one of the outstanding entomologists of the U. S., not only tells the fisherman everything he ought to know about bait insects—their characteristics, how and when to collect or trap them, how to rear and preserve them—but he illustrates these immature or adult insects by 63 pages of large drawings or photographs. Here is a ready-made means of promoting biology among the lay public, for the book should lure all serious anglers and should make a good present from the biologist to his fishing friends. *F. L. Campbell.*

The Mutants of Drosophila Melanogaster. NORMA B. BRAVER. 36 pgs. Carnegie Institution of Washington, 1530 P St., N.W., Washington 5, D. C. (1956) $0.25

In this small pamphlet the mutants of *Drosophila melanogaster* have been classified according to the parts of the body affected. The following classes are also included: behavior, eggs, larvae, late hatching, lethals, pupae, sex ratio, sterility, temperature sensitivity, tumors, and viability.

Index to Copeia. 1913-1954. Part I. Author Index. Part II. Subject Index. CLYDE F. REED. 106 pgs., 332 pgs. American Society of Ichthyologists and Herpetologists, c/o Secretary, Arnold Grobman, Florida State Museum, Gainesville, Florida.

Index-Catalogue of Medical and Veterinary Zoology. MILDRED A. DOSS, J. M. HUMPHREY and D. B. SEGAL. U. S. Department of Agriculture. Obtainable from U. S. Government Printing Office, Washington 25, D. C. (1956) $1.50

PLANT SCIENCES

★**Chromosome Botany.** C. D. DARLINGTON. 186 pgs., illus. Distributed by The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y., for George Allen & Unwin Ltd., London. (1956) $2.75

Experimental breeding and chromosome study, which together supply the foundations of genetics, are often not fields pursued equally by geneticists. Experimental breeding concentrates on a few hundred species, mostly cultivated, while chromosome studies are diffused over many thousands of species, mostly wild. Combining this accumulated knowledge of both wild and cultivated species and the relationship to ecology and systematics, is the purpose of this small book by one of England's outstanding geneticists.

★**Forage Crops.** GILBERT H. AHLGREN. 536 pgs., illus. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N. Y. (2nd edition, 1956) $7.00

A fine text that stresses principles rather than details, *Forage Crops* can also be used as a reference work. In this revised second edition, the term "forage crops" has been used to include hay, pasture, silage and seed production. The book is intended to be used following basic courses in agronomy, botany and soils. Approximately two-thirds of the text is taken up with individual species study. The remainder is devoted to grass-legume mixtures, soil treatment, seedbed preparations, the making of hay and silage, and other subjects common to the field as a whole. The author is Professor and Chairman of the Department of Farm Crops, Rutgers University.

★**Botany.** PAUL WEATHERWAX. 509 pgs., 305 figs. W. B. Saunders Company, West Washington Square, Philadelphia 5, Pa. (3rd edition, 1956) $5.75

This new edition of a well-accepted botany text was prepared to permit a fuller adoption of the modern classification of plants, to rearrange and expand certain parts and to clarify some sections. The first twenty-two chapters deal with general principles of biology as they are illustrated by plants. The remainder of the book deals with specific groups of plants for their own sake. The material is so arranged that many topics can be shifted about in order of presentation. A glossary appears at the end of the book, as before, and questions and topics for study are to be found at the end of each chapter.

Cone-Bearing Trees of the Pacific Coast. N. A. BOWERS. 169 pgs., 62 plates. Pacific Books, Box 558, Palo Alto, California. (5th edition, 1956) $3.50

Written at a level between the scientific treatise and the popular nature book, this small volume was designed to assist non-botanist and laymen alike in the identification of the native conifers of the Pacific Coast. Three novel keys are offered by the author: the Needle Key, the Elevation Key and the Geographic Key. In this fifth edition, a new chapter on Tree Ring Analysis has been added.

The Genus Achlya: Morphology and Taxonomy. TERRY W. JOHNSON, JR. 180 pgs., 22 plates. University of Michigan Press, Ann Arbor, Mich. Vol. XX, Scientific Series. (1956) $4.50

The genus *Achlya* belongs in the family Saprolegniaceae and no definitive work has been published since 1923. The author, assistant professor at Duke University, gives a new account of the genus, bringing together in one place the published studies of the morphology and systematics of the various species. Twenty-two plates of excellent illustrations assist in identification. The material is carefully assembled and attractively laid out for which both the Press and the author should take credit.

The Hardiness of Plants. J. LEVITT. 278 pgs., illus. Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. (1956) $7.00

This is Volume VI in Agronomy, a series of monographs prepared under the auspices of The American Society of Agronomy. One of the oldest problems in the field of plant sciences is the ability of some plants to withstand extremes of temperature and moisture and others to succumb. This book was prepared "to (a) bring together the known facts on hardiness in a single volume which is intended not only for those involved in basic plant physiological studies but also for workers concerned with the many agronomic and horticultural problems that involve crop responses to environment and (b) to stimulate further research by presenting hypotheses that are based on the known facts but that must be tested by experiment."

★**Diseases of Fruit Crops.** HARRY W. ANDERSON. 501 pgs., 94 figs. McGraw-Hill Book Company, 330 West 42nd St., New York 36, N. Y. (1956) $8.50

Information about diseases of deciduous fruits in the United States is contained in either bulletins and circulars from experiment stations and the USDA, or in a book now 36 years old. With this in mind, the author has prepared a text for research workers, teachers, and practicing horticulturists that provides all necessary information on fruit diseases, except for those of citrus and subtropical fruits. The discussion of each disease follows a definite order: history, geographic distribution, symptoms, causal organism, hosts, morphology of the pathogen, disease cycle, and control, followed by a list of selected references. New and rare disease conditions are included and new control methods given. The author is professor of plant pathology at the University of Illinois.

★**Chromosome Atlas of Flowering Plants.** C. D. DARLINGTON and A. P. WYLIE. 519 pgs. The Macmillan Co., 60 Fifth Ave., New York 11, N. Y. (2nd edition, 1956) $10.50

The first edition of *Chromosome Atlas* appeared in 1945 and covered cultivated plants. The present edition has been extended to include all flowering plants—a total of 17,000 species. The material is arranged in tabular form with the scientific name, common name (when known), reference to original work, and geographic distribution listed for all species. The systematic botanist, the plant breeder and the cytologist should find this publication indispensable.

Photosynthesis and Related Processes. Vol. II, Part 2. EUGENE I. RABINOWITCH. 2088 pgs., illus. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. (1956) $18.50

The opening paragraph of the author's preface is an eloquent accounting of this series of publications. "This volume brings to completion the review of *Photosynthesis and Related Phenomenon* which the author rashly undertook to prepare, for his own orientation, in the summer of 1938. Two months at Woods Hole, with its splendid library, seemed, at that time, an adequate period to complete the undertaking; and Interscience Publishers temptingly offered to publish the result in book form. Seventeen years and 2000 printed pages later, it is time to stop—even if this closure has to come in the midst of rapid and promising developments in several areas covered by the narrative." Volume II, Part 2 includes sections on: The Temperature Factor, The Pigment Factor; Time Effects: Induction Phenomena; Photosynthesis in Intermittent Light; Photochemistry of Chlorophyll *in vitro* and *in vitro*; Chemical Path of Carbon Dioxide Reduction; Miscellaneous Additions to Volume I and II, Part 1; Epilogue.

★The History of the British Flora. A Factual Basis for Phytogeography. H. GODWIN. 384 pgs., illus. Cambridge University Press, 32 East 57th St., New York 22, N. Y. (1956) $16.50

The flora of islands have never ceased to fascinate amateur and professional botanists alike. Speculation on the origin of British flora is long standing and controversial. Increased recent knowledge of the Ice Age and the development of pollen analysis have done much to provide answers in place of speculation. In this book, all of the well-dated records of plants of the Quaternary Period are made available and possible general conclusions are drawn by the author. The processes by which the modern British flora came to its present composition and existing ranges is carefully outlined. Dr. Godwin also takes pains to indicate the limitations as well as the potentialities of the methods he uses and describes. The volume, handsome in a large page size, is well illustrated and designed.

Principles of Fungicidal Action. JAMES G. HORSFALL. 279 pgs. Vol. 30, New Series of Plant Science Books, Chronica Botanica Co., Waltham, Mass., and Hafner Publishing Co., New York, N. Y. (1956) $6.50

One of man's long-standing battles has been with the fungi and over the years perhaps the farmer has fought the longest and hardest. Introducing the subject historically, Dr. Horsfall, Director of the Connecticut Agricultural Experiment Station, discusses the development of fungicidal agents and the mechanisms of fungicidal action. He describes the physics and chemistry of protection and the mechanisms of fungitoxicity that unlie successful protection. The last ten years have seen tremendous advances in establishing concepts about antimetabolites, chelation, and physical toxicity. The "art" of using fungicides has been omitted since several practical publications are in existence. The author says in his preface, "Actually, I hope to elicit some quarrelsome interest in fungicides. The last word is never uttered in science. More work needs doing. If this book stimulates any, I shall be repaid."

Results of 1955 Fungicide Tests. Reprinted by the American Phytopathological Society, 1956. $1.00 per copy from Dr. A. G. Newhall, Department of Plant Pathology, College of Agriculture, Ithaca, N. Y.

MISCELLANEOUS

Trace Elements in Human and Animal Nutrition. E. J. UNDERWOOD. 430 pgs., illus. Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. (1956) $9.50

The author says of his book, "It is not written for those who are primarily dietitians, biochemists, or pathologists, although inevitably there is much in it to interest all three. This book is written for those who plan to specialize in nutrition, or who are already specialists in nutrition." A balance is maintained between the biochemical, pharmacological and toxicological aspects of trace elements, with an historical approach preserved whenever possible. It is claimed that the book is a "first" in the field, since the only predecessors were limited to special areas of the subject and did not deal generally with trace elements from the point of view of their nutritional significance to man and his domestic animals. The author is with the Institute of Agriculture at the University of Western Australia.

★Elements of Genetics. EDWARD C. COLIN. 498 pgs., 152 figs. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. (3rd edition, 1956) $5.75

In this third edition of *Elements of Genetics,* a college text, the most interesting and significant of recent advances have been incorporated and all discussions brought up to date. Two entirely new chapters have been added: Domesticated Plants and Domesticated Animals. Students of agriculture and animal breeding should find this new material of special interest since such information is usually widely scattered in journals. New illustrations increase the usefulness of many sections. The historical approach has been maintained and is one feature of this text that sets it apart from many others.

Therapeutic Use of Artificial Radioisotopes. Edited by PAUL F. HAHN. 414 pgs., illus. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. (1956) $10.00

For twenty years artificially induced radioactive materials have been available from the cyclotron and for ten years similar products have come from the chain-reacting piles. Today nearly one thousand different radioactive materials are available to the radiological clinician. Although the answer to the cancer problem doubtless lies in prevention or interruption of growth at the source, the palliative treatment of a well-established neoplasm is still important. Much research still needs to be done on the uses of ionizing radiations and this volume, written by a panel of world experts, discusses basic research, limiting factors, maximal tolerable doses, and clinical results of a wide variety of the usable medical radioisotopes.

★School Health Practice. C. L. ANDERSON. 560 pgs., illus. The C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo. (1956) $4.75

In his preface the author writes, "Health promotion is a recognized component of present-day functional public school education which is designed to prepare each youngster to deal with life's academic, cultural and practical needs. The *what*, the *how*, and the *why* of the functional school health program is the substance of this publication." Subject matter is divided into the following sections: The School Age Child, Organization of the School Health Program, School Health Services, Health Instruction, Healthful School Living, and Mensuration in School Health Practice. The text seems to be designed for a course on the subject in an Education Department or for the in-service education of practicing teachers.

★Personal and Community Health. C. E. TURNER. 660 pgs., illus. The C. V. Mosby Co., 3207 Washington Blvd., St. Louis 3, Mo. (10th edition, 1956) $4.75

Judging by the fact that this is the tenth edition of *Personal and Community Health,* it could be assumed that it is a popular text on the subject. The author, now Professor of Public Health Emeritus, Massachusetts Institute of Technology, spent part of his professional career at Tufts Medical and Dental Schools, and at the University of California. The subject matter of Dr. Turner's book is well organized, sensibly handled and adequately illustrated.

Hormones and the Aging Process. Edited by EARL T. ENGLE and GREGORY PINCUS. 323 pgs., illus. Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. (1956) $8.50

This publication is the proceedings of a conference held at Arden House, Harriman, N. Y., in May 1955, under the sponsorship of G. D. Searle & Company, Illinois. With the rapid development of hormone chemistry and physiology in recent years, the role of hormones in involutional processes has been substantially advanced. It was felt that a symposium would serve a useful purpose if it brought out the recent basic biological findings along with specific clinical studies in which these findings were applied. Participants included: A. Albert, J. C. Aub, H. Brendler, W. Consolazio, V. A. Drill, L. L. Engel, E. T. Engel, G. C. Escher, G. S. Gordon, S. R. Hall, R. G. Hoskins, D. J. Ingle, J. W. Jailer, B. J. Kennedy, C. D. Kochakian, D. Laszlo, H. Spencer, J. H. Leathem, W. H. Masters, O. H. Pearson, G. Pincus, R. W. Rawson, A. L. Raymond, L. T. Samuels, N. W. Shock, S. G. Taylor, P. L. Wermer, R. E. Weston, G. D. Whedon, A. White, and I. C. Winter.

★Handbook of Histology. KARL A. STILES. 240 pgs., illus. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. (4th edition, 1956) $3.00

The wide use of three previous editions of this compact, paperbound handbook of histology resulted in a new, thoroughly revised fourth edition, incorporating many of the suggestions made to the author by instructors and students.

★**Polysaccharides in Biology.** Edited by GEORG F. SPRINGER. 270 pgs., illus. The Josiah Macy Jr. Foundation Publications, 16 West 46th St., New York 36, N. Y. (1956) $5.00

The usual high caliber and informal nature of the Macy Foundation Symposia is maintained in this publication of the first conference on *Polysaccarides in Biology*. Contents include a discussion of Problems of Communication by Karl Meyer; Bacterial Polysaccarides by Michael Heidelberger, and Blood Group Substances by W. T. J. Morgan. The very nature of these conferences often uncovers the basis for contradictory findings, eliminates overgeneralization, and allows for critical judgment of both published and unpublished data.

★**Neuropharmacology.** Edited by HAROLD A. ABRAMSON. 329 pgs., illus. The Josiah Macy Jr. Foundation Publications, 16 West 46th St., New York 36, N. Y. (1956) $4.25

This is a complete publication of the second Macy Conference on *Neuropharmacology*. As is customary, the participants are drawn from many professions and discussion is lively and critical. This particular subject is especially timely since both medical men and the public are much interested in psychiatric drugs and drug-induced psychoses. Subjects and authors are: Lysergic Acid Diethylamide (LSD) and Related Compounds, Aurelio Cerletti; Effect of Drugs on the Behavior of Animals and Psycoses of Man, Stephen L. Sherwood; Research on Schizophrenia, Humphry Osmond; Experimentally Induced Psychoses in Man, Max Rinkel; and Tolerance to LSD-25 and a Theory of Psychoses, Harold A. Abramson.

An Ecological Glossary. J. RICHARD CARPENTER. 306 pgs. Hafner Publishing Co., 31 East 10th St., New York 3, N. Y. (Reprint 1956) $5.75

This is a Hafner reprint of an earlier (1938) publication of the University of Oklahoma Press. Nearly 3,000 definitions in ecology are presented (in many cases taken from the original citations) with subsequent refinements of usage and meaning. The references supplied are to generally available papers in which definitions and concepts are discussed in detail.

Fertilization. LORD ROTHSCHILD. 170 pgs., illus. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. (for Methuen & Co., London). (1956) $3.50

The subject of this book is "the life of the egg from the attachment of the fertilizing spermatozoon to the fusion or apposition of the male and female pronuclei." The author recommends that it be read by those "who have read, or are reading, Gray's *Experimental Cytology*, Heilbrunn's *Outline of General Physiology*, Fraton & Simonds' *General Biochemistry*, Höber's *Physical Chemistry of Cells and Tissues* and similar textbooks." This statement places *Fertilization* in its proper environment. At the conclusion of his Preface, Lord Rothschild writes, "One function of a new theory is to provoke further experiments and, although I have no new theory of fertilization to offer, I hope that this end, at least, will be achieved."

Medicinal Chemistry. Vol. II. Edited by F. F. BLICKE and C. M. SUTER. 311 pgs. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. (1956) $10.00

This is Volume II of a series of reviews prepared under the auspices of the Division of Medicinal Chemistry of the American Chemical Society. One of the chief objectives of *Medicinal Chemistry* is to include in each chapter references to all the compounds that have been tested for a particular type of pharmacological activity. Volume II contains: Some Chemical Aspects of the Cardiac Glycosides, by Arthur Stoll; Supplement, by T. L. Johnson; Synthetic Estrogens, by John A. Hogg and Jerome Korman; Analgesics: Arylpiperidine Derivatives, by C. M. Suter; β-Haloethylamine Adrenoergic Blocking Agents; Chemistry and Structure-Activity Relationship, by Glenn E. Ullyot and James F. Kerwin.

Medicinal Chemistry. Vol. III. Edited by F. F. BLICKE and R. H. COX. 346 pgs., illus. John Wiley and Sons, 440 Fourth Ave., New York 16, N. Y. (1956) $10.00

Volume III of this series, prepared under the auspices of the American Chemical Society (Division of Medicinal Chemistry), contains the following papers and speakers: Methadone and Related Analgesics, by Thomas P. Carney; Quartenary Ammonium Germicides, by Peter L. deBenneville; Non-Mercurial Diuretics, by Viktor Papesch and Elmer F. Schroeder; and Synthetic Analogs of Physostigmine, by Arthur Stempel and John A. Aeschlimann.

The Plankton of the Beaufort and Chukchi Sea Areas of the Arctic and its Relation to the Hydrography. MARTIN W. JOHNSON. 32 pgs. The Arctic Institute of North America, 3485 University St., Montreal 2, Quebec, Canada. (1956) $0.50

This booklet is the first publication in a new series, *Technical Papers of the Arctic Institute of North America*. The author is professor of marine biology at the Scripps Institution of Oceanography and his report is based on collections made during the summers of 1950 and 1951.

Bibliography of Medical Reviews. 1955. Edited by SEYMOUR I. TAINE. 74 pgs. Armed Forces Medical Library, Washington 25, D. C. (1956)

This publication is a "trial balloon" of the Armed Forces Medical Library—an attempt to list all review articles in a particular field that have appeared during a one year period in regular periodicals or project reports. Subject headings have been "assigned on broad, quasi-classified bases with liberal use of cross-references to assist the user interested in finding review articles on more specific topics." Expressions of opinions about the method of collecting and publishing these references and the advisability of continuing the service are being sought by the Editor.

★**Nerve Impulse.** Edited by DAVID NACHMANSOHN and H. HOUSTON MERRITT. 256 pgs., illus. The Josiah Macy Jr. Foundation Publications, 16 West 46th St., New York 36, N. Y. (1956) $4.50

Nerve Impulse contains the transactions of the fifth and final Macy conference on the subject, held at Princeton, September 1954. Nineteen scientists from variius fields participated. Subjects discussed and authors included: Brain Stem and Higher Centers, Horace W. Magoun; The Corticospinal System, Carl Gustaf Bernhard; Properties of Nerve Impulses, Herbert H. Jasper; Monosynaptic Reflex Behavior of Individual Spinal Motoneurons, David P. C. Lloyd; and Some Properties of Excitable Tissue, Harry Grundfest.

★**Group Processes.** Edited by BERTRAM SCHAFFNER. 255 pgs., illus. The Josiah Macy Jr. Foundation Publications, 16 West 46th St., New York 36, N. Y. (1956) $3.50

This volume contains the transactions of the Second Conference on *Group Processes*, held at Princeton in October 1955. This particular transaction introduces a new feature for the Macy publications—a section at the beginning where each participant introduces himself and explains his background, scientific interests and reasons for being present. This is a very worthwhile addition to any conference proceedings. Subjects and authors include: Social Structure Among Penguins, William J. L. Sladen; Neonate-Mother Relationship in Goat and Man, Helen Blauvelt; Kinesic Analysis of Filmed Behavior of Children, Ray L. Birdwhistell; The Message "This is Play", Gregory Bateson.

★**Medical Effects of the Atomic Bomb in Japan.** Edited by ASHLEY W. OUGHTERSON and SHIELDS WARREN. 477 pgs., illus. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. (1956) $8.00

Unprecedented problems in medicine were created when atomic bombs were detonated over Hiroshima and Nagasaki in 1945. Various Joint Commissions, working with Japanese scientists, have

been gathering data since that date. The assimilation, organization, analysis and collation of this enormous mass of data and its presentation in a coherent and useful form, resulted in this volume. The two editors of this difficult task and the many who contributed to the preparation of material, deserve thanks. This treatise is the most authoritative available on the casualty effects of atomic weapons. Let us hope that it is a definitive work. A glance at the often-gruesome illustrations should do much to make the use of the causative agent obsolete. This volume is one of a series which has been prepared as a record of the research work done under the Manhattan Project and the Atomic Energy Commission.

★Evolution: The Ages and Tomorrow. G. MURRAY McKINLEY. 275 pgs. The Ronald Press Co., 15 East 26th St., New York 10, N. Y. (1956) $4.00

"Man is the first ceature equipped to gain sufficient understanding to influence his own evolution. As soon as that fact is realized, a knowledge of the evolutionary forces that have formed him assumes the highest priority," writes the author in his preface. Dr. McKinley speculates on the origins of the cosmos and the earth, traces the evolutionary process in atoms and molecules, living cells, and increasingly complex animals, and dwells finally on the emergence of man and human society. The material is thoughtful, lucidly expressed and broadly encompassing.

Peaceful Uses of Atomic Energy. Proceedings of the International Conference in Geneva, August 1955. Vol. 10. 544 pgs., illus. Columbia University Press, 2960 Broadway, New York 27, N. Y. (1956) $8.00

It seems to be commonly accepted that we are in the Atomic Age—and likely to remain so for many years. It seems only sensible that every scientist and every citizen learn as much as he is capable of learning about the various phases of atomic energy that daily change his way of living and thinking. The first International Conference on Peaceful Uses of Atomic Energy was a valiant effort on the part of many nations to gather together and share their common knowledge on the subject. The results of the Conference have been printed in 16 volumes, averaging 550 pages each, and listing all of the papers presented at the Conference. Volume 10, quoted above, and two others that follow, deal with biological and medical contributions, and records of the Conference as a whole. They offer the quickest and most thorough means of becoming aware of and familiar with these aspects of the uses of atomic energy.

Volume 10 is titled "Radioactive Isotopes and Nuclear Radiations in Medicine" and includes 84 papers on the applications to therapy, diagnosis, and study of disease; and the application of radioisotopes to biochemistry, pathogenesis, and metabolic disorders.

The Volumes have been attractively styled and well illustrated and are certainly a credit to the editors and the Columbia University Press.

Peaceful Uses of Atomic Energy. Volume 11. 402 pgs. Columbia University Press, 2960 Broadway, New York 27, N. Y. (1956) $8.00

Volume 11 includes the Conference papers presented on "Biological Effects of Radiation." In it will be found discussions of modes of radiation injury, and the biological effects (including genetic effects) and mechanisms of radiation energy. Also included, are the methods under study of promoting recovery from overdoses of radiation. As is the case in each volume, the individual papers (63 in Vol. 11), include extensive bibliographies and more than adequate illustrative material.

Peaceful Uses of Atomic Energy. Volume 16. 203 pgs. Columbia University Press, 2960 Broadway, New York 27, N. Y. (1956) $5.00

The final volume in this notable series contains the history of the Conference, the important lectures delivered by twelve of the most outstanding scientists of the world, the official documents of the Conference, and addresses delivered by President of the Conference.

★Blakiston's New Gould Medical Dictionary. Edited by NORMAND L. HOERR and ARTHUR OSOL. 1463 pgs., illus. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y. (1956) $11.50

It is not customary to review dictionaries in this column but the publication of a new or revised medical dictionary is an event to which biologists could well have their attention drawn. This particular dictionary was first published in 1926, with predecessor of other names, appearing as early as 1890. The new edition contains 12,000 *new* terms, makes 8,000 changes and thereby offers more terms than any other medical dictionary in existence. The size and weight are large but not unwieldly. 252 illustrations are used; 129 in color. A distinguished editorial board and 88 contributors from specialized fields ensure accuracy and breadth.

The Biological Basis of Human Freedom. THEODOSIUS DOBZHANSKY. 139 pgs. Columbia University Press, 2930 Broadway, New York 27, N. Y. (1956) $2.95

The five chapters of this relatively short book are expanded versions of the Page-Barbour Lectures delivered by the author at the University of Virginia in March of 1954. Dr. Dobzhansky is one of our foremost biologists and this is his attempt to interpret "some of the philosophical implications of modern biology in terms which a layman can understand." In his preface, the author makes a point that should serve as a challenge to many of his fellow-biologists, "The current surge of anti-intellectualism should stimulate scientists to try to explain to their fellow citizens that science leads not only to the invention of new gadgets and of atomic and other bombs but also to the acquisition of new insights into human nature and man's place in the universe."

E. A. Birge: A Memoir. G. C. SELLERY. 221 pgs., illus. University of Wisconsin Press, 811 State St., Madison, Wis. (1956) $3.50

Many great American scientists and academic administrators have been known to their contemporaries as fascinating personalities as well as capable research workers. Very often their professional skills are all that succeeding generations ever know about them and the picture of the "whole man" is lost. The need for well-written biographies that document the many facets of a scientist's life is obvious but seldom accomplished. This book is one of the exceptions. The parallel growth of a man and the institution to which he devoted his life, is traced by Dean Emeritus G. C. Sellery, a colleague and neighbor of President Birge of the University of Wisconsin. Historians as well as biologists will find the pages of this book well worth investigation. Much of the material is documented but this is never allowed to detract from the active thread of the story. Biologists will be particularly interested in a final chapter, "Birge the Limnologist, an Explorer of Lakes" by C. H. Mortimer.

★Science and Civilization in China. Vol. II. JOSEPH NEEDHAM. 696 pgs., illus. Cambridge University Press, 32 E. 57th St., New York 22, N. Y. (1956) $14.50

The immensity of the task that Dr. Needham set out to perform in this series would have completely overwhelmed a lesser man. For one man to attempt the complete survey of Chinese civilization and scientific development is staggering even in contemplation. No spade work in the field had ever been done and only the combination of a professional scientist and a sinologist of considerable scholastic stature could have undertaken the study. Two volumes have now appeared and both are absorbing documentations. The second volume is devoted to the history of scientific thought in China through the Confucian milieu, the great Taoist school, the philosphies of the Mohists, Logicians and Legalists up to the scientific thinking of the Chinese middle ages, and the Neo-Confucianism that followed. It concludes a discussion of the conception of the Laws of Nature in China and the West. The late George Sarton said of the author, "In spite of his great love of China and of his enthusiasm, he never loses his sense of proportion and the necessary objectivity."

(Continued on page 45)

Biological Programs at AAAS New York Meeting

December 26-31, 1956

THE 123rd meeting of the American Association for the Advancement of Science in New York City will include some 325 sessions of 18 AAAS Sections and some 86 participating organizations. Programs of particular interest to biologists follow.

AAAS General Symposium

The Committee on AAAS Meetings has established the policy that each annual meeting of the Association should emphasize programs important to science as a whole. "Moving Frontiers of Science"—an integrated critique of significant recent developments in the sciences—was decided upon as the 1956 theme.

"Fundamental Concepts and Units of Science". Part I. *Dec. 27, p.m.* Opening discussion by panel. Addresses by invited speakers: J. R. Zacharias (Physics), R. W. Gerard (Biology), R. McLeod (Social Sciences). Part II. *Dec. 28, p.m.* A Synthesis, Michael Polanyi. Concluding discussion by panel and speakers.

Section C—Chemistry

Symposium: "Chemical and Biological Aspects of Cellular Competition", program of Section C, cosponsored by American Society of Naturalists, and Society of General Physiologists. *Dec. 27, a.m.* J. Gots, J. Streisinger, W. Braun, S. M. Rose, J. J. Biesele.

Sections F and G—Biological Sciences

Symposium: "Biochemistry of the Cell Nucleus", program of Section F, cosponsored by Section G and the Genetics Society of America. *Dec. 28, a.m.* A. W. Pollister, C. Leuchtenberger, J. H. Taylor, M. Alfert, G. T. Rudkin.

Symposium: "Some Unsolved Problems in Biology", program of Section G, cosponsored by the Botanical Society of America and Section F. *Dec. 28, a.m.* B. D. Davis, B. Commoner, A. E. Mirsky, K. W. Cooper.

Symposium (2 sessions): "Problems of Aging", joint program of Sections F, G, and I and the American Society of Zoologists, sponsored by Atomic Energy Commission through the Brookhaven National Laboratory. *Dec. 29, a.m. and p.m.* A. I. Lansing, W. J. Robbins, A. L. Delisle, N. W. Shock, H. B. Jones, H. A. Blair, J. E. Birren, I. Lorge.

Ecological Society of America

Symposium: "Ecology of Grasslands". *Dec. 27, p.m.* R. T. Coupland, L. Ellison, E. J. Dyksterhuis, C. McMillan.

Contributed papers, cosponsored by Sections F and G. *Dec. 27, a.m.* plant ecology: *Dec. 27, p.m.* animal ecology.

Invited papers: "Social Significance of Ecological Research". *Dec. 29, a.m.* plant: *Dec. 29, p.m.* animal.

Symposium: "Values in Human Ecology". *Dec. 28, a.m.* S. A. Cain, M. Mead, G. B. Happ, P. B. Sears.

New York Academy of Sciences

Symposium (2 sessions): "Modern Ideas on Spontaneous Generation," cosponsored by Sections F and G. *Dec. 26, a.m. and p.m.* H. Koprowski, S. L. Miller, P. H. Abelson, S. H. Hutner, M. Sanders, J. A. McLaughlin, S. Scher, S. Granick, H. F. Blum, A. Gulick, R. C. Warner, D. Harker, S. W. Fox, C. C. Lindegren, G. Wald.

Society for the Study of Evolution

Contributed papers. *Dec. 27, 28, a.m.; Dec. 29, p.m.*

Symposium: "Biotic Communities in the Past and Today", cosponsored by the Society of Vertebrate Paleontology and the American Society of Naturalists. J. C. Clausen, E. Dorf, J. T. Gregory, P. B. Sears. *Dec. 29, a.m.*

Section F—Zoological Sciences

Symposium: "Museum Techniques", jointly with the American Museum of Natural History. Also demonstrations and exhibits. *Dec. 26, a.m. and p.m.*

Zoologists' Luncheon and Vice-Presidential Address "In Pursuit of a Gene" by B. Glass. *Dec. 28.*

Entomological Society of America

Symposia on Teaching Entomology, Museums and the Problems, and the Nematode Situation.

Contributed papers. *Dec. 27-30.*

Entomologists' Luncheon. *Dec. 29.*

International Union for the Study of Social Insects, North American Section

Symposium: "Communication in Insects", cosponsored by Section F. I. Perspective on Fact and Theory. *Dec. 26, p.m.* V. G. Dethier, E. O. Wilson, A. C. Cole, T. C. Schneirla, J. A. Downes, N. A. Weber, J. B. Calhoun. II. Problems and Methods. *Dec. 27, a.m.* E. S. Hodgson, Ilse Schwinck, A. E. Treat, Horst Mittelstaedt, T. Waterman, W. Van der Kloot.

Society of Systematic Zoology

Symposium: "Insects in Nature", jointly with the Ent. Soc. of America. *Dec. 30.*

Contributed papers. *Dec. 27-30.*

Section G—Botanical Sciences

Symposium: "Genetics of Fungi", jointly with Mycological Society of America. *Dec. 26, p.m.* Harry Wheeler, Alec J. H. Carr, Patricia St. Lawrence, Haig Papazian.

Contributed papers on General Botany, joint session of Section G and the Torrey Botanical Club cosponsored by the Botanical Society of America. *Dec. 27, a.m.*

Contributed papers on Plant Physiology, session of Section G cosponsored by the American Society of Plant Physiologists, the Botanical Society of America, and the Society of General Physiologists. *Dec. 30, a.m.*

Botanists' Dinner, in honor of the Botanical Society of America; Vice-Presidential address "Some Implications of the Concept of Outer Space" by P. J. Kramer, *Dec. 27.*

Section N—Medical Sciences

Symposium (4 sessions): "Evolution of Nervous Control from Primitive Organisms to Man", cosponsored by Society of General Physiologists. *Dec. 29, 30, a.m. and p.m.* E. W. Sinnott, M. C. Niu, C. L. Prosser, H. Grundfest, G. B. Koelle, J. C. Lilly, K. Killiam, J. Brady, H. L. Teuber, I. H. Page, S. Bessman, I. A. Mirsky.

Section O—Agriculture

Contributed papers. *Dec. 27, 28, a.m.*

Symposium (4 sessions): "Grasslands in Our National Life", cosponsored by Sections G and K and the American Society of Range Management, American Meterological Society, Ecological Society of America, and others. *Dec. 29, 30, a.m. and p.m.* J. W. Bartlett, R. E. Mather, J. L. Casin, G. K. Davis, K. C. Beeson, R. E. Ely, L. A. Moore, E. W. Cheng, W. Burroughs, M. B. Tesar, J. B. Washko, H. R. Fortmann, H. A. MacDonald, K. W. Kreitlow, W. A. Baker, A. A. Hanson, J. R. Harlan, M. G. Weiss, R. B. Alderfer, M. A. Sprague.

American Society of Range Management

Symposium: "Range Management". *Dec. 28 p.m.* W. Keller, J. L. Schwendiman, C. E. Poulton, C. W. Tomanek, H. G. Reynolds, A. Heerwagen.

General Events

AAAS Presidential Address by George W. Beadle. Reception. *Dec. 28, eve.*

AAAS Smoker. *Dec. 29, eve.*

AAAS Annual Exposition of Science and Industry. *Dec. 26-30.*

AAAS Science Theatre. *Dec. 26-30.*

Coupons for sleeping accommodations and for advance registration will be found in *Science* and *The Scientific Monthly.*

Are you insured in th

The AIBS LIFE PLAN gives members an unusual opportunity!

Last August the AIBS Governing Board enthusiastically approved establishment of a life insurance plan to be sponsored by the Institute. This AIBS LIFE PLAN is to the best of our knowledge the first insurance offered to its members by a scientific organization such as the AIBS.

The AIBS LIFE PLAN is designed to appeal to the younger biologists who belong to the Institute. It should be of particular interest to graduate students, instructors just beginning their teaching careers, laboratory technicans and other young biologists in industrial and commercial concerns. Any person under age 40 who belongs to an AIBS Member Society or who is an Individual Member of AIBS is eligible to be included in the plan.

The AIBS LIFE PLAN makes it possible for members of AIBS to carry a substantial amount of life insurance during their early years at very low cost. Low mortality in the profession, partial administration of the plan by AIBS and voluntary enrollment by members of the AIBS all combine to make possible this low cost life insurance.

It should be made clear that the AIBS is not entering the insurance business in any sense. This is, rather, another example of a service the AIBS can perform for its members—a service that we hope will be worthwhile.

The following pages contain factual information about the plan, together with an application form for your use. We recommend that you give serious consideration to the AIBS LIFE PLAN.

Sincerely yours,

Hiden T. Cox

HIDEN T. COX, *Executive Director*
American Institute of Biological Sciences

the AIBS Life Plan?

• What Kind of Insurance Is It?

The AIBS LIFE PLAN provides $10,000 of life insurance for men and either $5,000 or $10,000 for women. The insurance is issued under an individual policy. Use of the combined purchasing power of the membership provides a flexible life insurance plan at lower rates than are available individually. Automatically after 10 years, or earlier if your desire, the policy is exchanged for an individual Whole Life Policy.

• What Does It Cost:

Age	Annually	Semi-Annually	Quarterly
Under 25	$50.00	$26.00	$13.25
25-29	60.00	31.00	15.75
30-34	75.00	39.00	19.75
35-39	100.00	52.00	26.25

(1) Rate at entry remains constant for the 10 year period.
(2) Double Indemnity or Accidental Death Benefits are included in the above premium rates.
(3) Female members may purchase $5,000 at one-half the above rates, if desired.

• Who Is Eligible?

Any person under age 40 who is a member in good standing of a Member Society of the American Institute of Biological Sciences, or an individual member of the AIBS. Unless otherwise requested, the AIBS Life Plan automatically continues on the Whole Life Plan at the end of 10 years or earlier if desired. While you are still young, insurable, and rates are lowest, you may avail yourself of this unusual opportunity.

• Is a Medical Exam Required?

No medical examination is required if you are in good health. If you do have a physical impairment, you may still be accepted for the AIBS LIFE PLAN after a satisfactory medical examination.

• How Are Death Benefits Paid?

The insurance is paid to the beneficiary you name in your application. Proceeds may be paid in a lump sum or in installments. You may change your beneficiary at any time. You may assign the insurance or transfer ownership of the policy.

• What If I Become Disabled?

Should you become totally and permanently disabled, your AIBS insurance will continue without further cost to you. If you are disabled at the end of the 10-year period, your AIBS policy will then be automatically changed for a Whole Life Policy of the same amount. This policy will remain in force without cost to you until recovery or death.

• What If I Terminate Membership?

If you are no longer in a Member Society of the American Institute of Biological Sciences, your AIBS policy may be continued for the balance of the 10-year period prior to conversion.

• May I Change to a Whole Life Policy While in AIBS?

Yes, this is one of the principle features of the AIBS LIFE PLAN. Unlike group insurance, your AIBS policy is an individual policy to do with as you see fit. You can change it at any time you choose to a Whole Life policy or to any other plan of permanent life or endowment insurance, such as 20 Pay Life or Retirement Income Policy, which best fits your situation. The policy may be dated at the time of exchange with a premium for your attained age. If you pay an additional charge, you may have the policy dated back to the date your AIBS policy was issued with a lower premium for your age at such date. No medical examination or other evidence of insurability is required to change your AIBS policy to a permanent life or endowment plan.

• Does the AIBS Policy Pay Dividends?

Yes. Dividends are assigned to AIBS to defray costs of its part in the administration of the plan. *After* your policy is converted to a form of permanent insurance, dividends go to you.

• How Do I Apply?

An official application form follows. You need merely complete and mail to:

AIBS Life Plan
The American Institute of Biological Sciences
2000 P Street, N.W., Washington, D. C.

The AIBS will certify that you are a member of a Member society or an individual member and forward your application to the insurance company. All further dealings will be between the company and yourself. The completion of this self-addressed application is all that is necessary. Send no money now. You will be billed later and notified of the effective date.

• How Do I Pay Premiums?

If you pay annually, semi-annually, or quarterly, you will receive a bill for the premium due before each due date. This is to be paid by the due date or within a grace period of thirty-one days. Payments should be sent directly to The American Institute of Biological Sciences.

• What Is the Effective Date?

Your AIBS Policy will become effective as soon as 2,000 eligible members have enrolled. We urge that you read this material thoroughly and enroll immediately in order that requirements be met for the AIBS LIFE PLAN promptly.

• Who Issues the Policy?

Your AIBS Policy is issued by the Minnesota Mutual Life Insurance Company, one of the 25 largest mutual companies in the United States. Minnesota Mutual's life insurance in force totals over a billion and a half dollars. The company has qualified representatives throughout the United States and Canada.

• Any Questions?

Address all questions on the AIBS LIFE PLAN to:
AIBS LIFE PLAN
2000 P Street, N.W., Washington 6, D. C.

AIBS LIFE PLAN APPLICATION

To the Minnesota Mutual Life Insurance Company for the AIBS Term Life Insurance Plan automatically convertible to the Whole Life Policy at the end of 10 years.

PLEASE PRINT OR TYPE ALL INFORMATION

(1) Name of Applicant

LAST FIRST MIDDLE INITIAL

(2) Height....

(3) Weight.....

(4) Permanent mailing address

STREET CITY ZONE STATE

(5) Date of Birth

MONTH DAY YEAR

(6) Amount of Insurance: Males $10,000 ☐

Females $5,000 ☐ or $10,000 ☐

(8) Premiums:

Annual $.....

Semi-Annual $.....

Quarterly $.....

(7) Employed by

(9) AIBS Society to Which you Belong

(10) Name of Beneficiary

(11) Relationship of Beneficiary

(12) Do you know of any impairment now existing in your health or physical condition?

Yes ☐ No ☐ If "yes," give particulars:

(13) Have you consulted a physician for any illness during the past three years?

Yes ☐ No ☐ If "yes," give particulars:

I HEREBY APPLY for the insurance described above and agree to pay premiums therefor at the rate shown above. All dividends declared under this policy during the term insurance period shall be the property of the American Institute of Biological Sciences.

INFORMATION in this application is given to obtain this insurance and is true and complete to the best of my knowledge and belief. The Company shall incur no obligation because of this application unless and until a policy is delivered to the Applicant and the first premium thereon is paid in full while the health or other conditions affecting insurability of the Applicant are as described in this application.

DATE SIGNATURE OF APPLICANT

Biolc gy Library—*Continued from p. 40.*

Currents in Biochemical Research, 1956. Edited by DAVID E. GREEN. 697 pgs., illus. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. (1956) $10.00

The first volume of *Currents in Biochemical Research* appeared ten years ago. It was well received by biologists, chemists, biochemists, and clinicians alike. Again a group of distinguished contributors have prepared a decennial survey of progress in most, although by no means all, important fields of biochemical research. The objectives of these essays are "to communicate to nonspecialists an overall impression of the present status of the significant problems in each field, to point up the broad strategy of current research." Twenty seven contributors show, as the editor says, that "the older problems of biochemistry are clearly moribund but the newer problems have the fascination and challenge of youth."

Introduction to Biological Science. CLARENCE W. YOUNG, G. L. STEBBINS and F. G. BROOKS. 55 pgs., illus., 244 figs. Harper and Brothers, 49 East 33rd St., New York 16, N. Y. (1956) $4.75

This attractive volume, based on Young and Stebbins "The Human Organisms and the World of Life", although not abridged from it, is designed for short courses in general biology or for survey or general college courses in the subject. The authors picture the life processes through the human species and its relationship to the organic world. Some 250 new illustrations by Louise Bush lend the volume originality and freshness.

The Dynamics of Living Protoplasms. L. V. HEILBRUNN. 327 pgs., illus. Academic Press Inc., 111 Fifth Ave., New York 3, N. Y. (1956) $6.50

L. V. Heilbrunn needs no introduction to zoologists, especially physiologists. In the preface to this new book, he says, "As simply as possible, I have attempted to show that our present knowledge of the colloid chemistry of protoplasm can help to interpret and to explain some of the most puzzling and intriguing problems that physiologists have had to face." Some of the subjects discussed include: protoplasmic viscosity, gels, electrochemistry, surface precipitation, clotting, contraction, conduction and transmission, division, suppression of division, stimulation, anesthesia, and homeostasis. The book is intentionally provocative at times but through such stimulus the author doubtless hopes to encourage research that may answer some of the remaining questions.

LABORATORY MANUALS

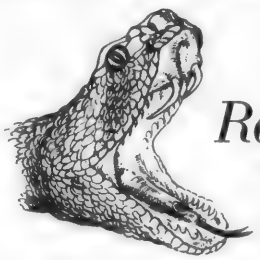
A Laboratory Guide in Virology. CHARLES H. CUNNINGHAM. 145 pgs., illus. Burgess Publishing Co., 426 S. 6th St., Minneapolis 15, Minn. (Revised edition, 1956) $3.00

Grinnell Workbook in Biology. Edited by NORMAN H. RUSSELL, JR. 56 pgs., illus. Burgess Publishing Co., 426 S. 6th St., Minneapolis 15, Minn. (1956) $1.75

Illustrated Laboratory Manual for Principles of Biology—I. WILLIAM H. BEHLE, LEWIS T. NIELSEN and GEORGE F. EDMUNDS. 51 pgs., illus. Burgess Publishing Co., 426 S. 6th St., Minneapolis 15, Minn. (1956) $1.50

The Fetal Pig. An Introduction to the Anatomy of the Fetal Pig. GRACE E. HOLSTAD. 42 pgs., illus. Burgess Publishing Co., 426 S. 6th St., Minneapolis 15, Minn. (Revised Edition, 1956) $2.00

Plants in Action. A Laboratory Manual of Plant Physiology. LEONARD MACHLIS and JOHN G. TORREY. 282 pgs., illus. W. H. Freeman and Co., 600 Market St., San Francisco, Calif. (1956) $3.75



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